FLIGHT

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OLYMPIA, 1910.—General views of the main hall from either end of the building. Note in the top picture the two spherical balloons, the property of Mr. Mortimer Singer, constructed of Continental fabric and varnished silk respectively, and exhibited by the Continental Co. and by Messrs. Short Bros.; in the lower photograph is the Willows airship, which, like the balloons, is suspended from the roof.

OLYMPIA—AND AFTERWARDS.

IT is positively amazing how much the aeroplane industry has developed during the past twelve months; the exhibits at Olympia would not disgrace a trade that had existed for a decade. Yet the first aero show in Britain was held last March, and the first aero salon that the world had ever seen was opened in Paris in the previous December. Less than eighteen months ago there was no such thing as an aeroplane industry, for, with the possible exception of Voisin, everyone was far too busy conducting personal experiments in flight to be concerned with the business aspect of their ambitions, which so many of them have since developed at such an extraordinary pace. Newcomers imbued with the spirit of enterprise, and blessed with temperamental optimism, have flocked into the movement while it is scarcely more than embryonic in point of age. By their very numbers they have so broadened the outlook that it is almost with a catching of the breath that one first grasps the significance of their collective presence at Olympia to-day. Flight is such a vast proposition for the world to accept that it was only reasonable to assume the present generation at least would grow old in forcing its mere introduction. But no, judging by the present exhibition it would seem as if we shall forestall our sons by realising many things that any ordinary rate of progress would have relegated to their day, even if not further still into the future.

There is no denying the extraordinary rapidity of modern thought and progress. For a thousand years the world almost stood still, and then came steam. In the hundred years that followed and is still un-run, the world has given birth to electricity, the motor car, and flight. Shorter and shorter have been the intervals between these epoch-making sons of time, and it would seem, indeed, as if development were governed by the "law of squares."

How long will it be before the flying machine is regarded as a "matter of course," like the motor car? Even now, the workmen in Short's factory no longer, we are told, look up from their work when an aviator is flying outside, so common has the sight become; yet it is but a few months since they turned out their first machine, with which Moore-Brabazon won the *Daily Mail* prize. Last year the visitor to the Olympia Aero Show was welcomed by the exhibitors as a spectator; this year they quite evidently expect him to be a buyer. The justification for this apparently ultra businesslike attitude on the part of manufacturers is, we fear, so little obvious to the general public that many visitors must feel tempted openly to pooh-pooh it. How many people in England fully realise the amount of flying that has been going on in our midst—scarcely a hundred perhaps. Not one man in every thousand that visited Olympia this week could possibly be expected to have grasped the real position that Great Britain already holds among the flying nations of the world. Partly owing to an innate dislike to publicity on the part of our aviators, and partly owing to the isolation of our flying grounds occasioned by the singularly unfortunate topography of our island, deeds such as would have been blazoned on the press of France have been allowed to pass unchronicled at home. Dotted in different parts of the country there have for some months existed veritable nests of aeroplanes that are seldom or never heard of until their occupants are fledged. It was in such secluded spots that many of the machines exhibited at Olympia were hatched.

Will the public take the bait and buy? The inscrutable mystery of human nature makes it impossible to be certain that they will, though we feel confident that the present exhibition must cause many people to become actively interested in the subject who paid their money at the turnstile with no other original intention than to satisfy curiosity and depart. And why should a man not buy an aeroplane to-day? There are aeroplanes at the show that have actually flown and most of the others are more or less copies of successful machines. The purchaser might buy any one of a dozen aeroplanes and therewith have every reasonable prospect of learning to fly. There are duplicates of the monoplane with which Blériot flew the Channel, of Farman's biplane with which Paulhan delighted the crowds at Blackpool, and of the biplane with which Wilbur Wright put confidence of success into other hearts in those earlier days when he excelled all men in flight. Since the last Show the Short biplane has won fame that is more than merited by the enterprise of this pioneer British firm, and in this machine the whole industry, let alone the makers, should feel justly proud. There is no better stimulus to prosperity in business than the rivalry of firms who do conscientious work, and Short Brothers have set a fair lead; they make good rivals, for they can respect good rivalry in others. Howard Wright, and also Handley Page, who were at the first show, have gained experience in aeroplane construction that must be invaluable to them, and already we see the Howard Wright name-plate on several machines that have been designed to order. A. V. Roe, too, is ever getting nearer to his goal. These, and some others that are absent, have worked hard and well as pioneers. They deserve encouragement. May they all succeed.

Welcome, too, must be extended to the newcomers, to Humber, Star, Berliet, Fiat, Darracq, George and Jobling, Motor Supply, Mann and Overton's, and Clement, all of whom have come over from the motor industry. Welcome also to Mulliner's of Long Acre, and Holland and Holland, from the coachbuilding industry, for their machines show the workmanship that we should expect from such sources. Welcome also to the other firms who are starting out to make a name, to Ripault, Twining, Lane, Lascelles, and to the British and Colonial Aeroplane Co. Surely with twenty-three firms exhibiting aeroplanes after one year's development, it may be justly said that the industry has shown amazing growth.

There is a phase of the aeroplane industry that has already developed, which is interesting and perhaps a little unexpected. We refer to the fact that two or three of the firms at present engaged in aeroplane construction have expressed their intention of building for the trade, so to speak. That is to say, when a small Syndicate is anxious to put their machine on the market without going to the expense of acquiring a factory of their own for its production, they can get their machines built to their own designs in the workshop of one or other of the firms who lay themselves out to do this sort of work. Howard Wright has adopted this policy, and we believe that it will also be the policy of Mulliners, who have exceptionally good wood-working machinery and a very large stock of timber in connection with their coachbuilding business. Although it is difficult fully to appreciate the importance of this move at such an early stage of proceedings, we are rather inclined to believe that it will be beneficial to

the industry generally, tending to make for sound prosperity and an absence of the company promoting phase that did so much harm in the early days of the cycle and automobile movements.

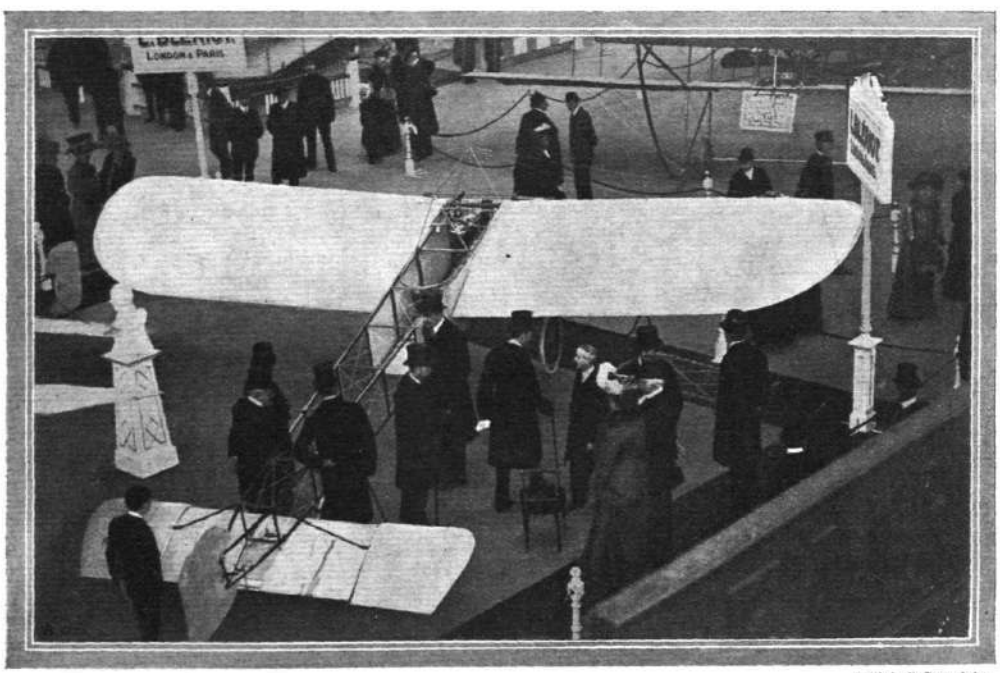
Serious enthusiasm is what is wanted more than anything to make aviation a success, and that is just what seems to us to be the keynote of the budding industry. It is an industry that is working against tremendous difficulties, especially in England, where the facilities for learning to fly are few and far between. It is difficult to know how to improve these conditions and to bring the aeroplane into sporting use by the greater number of those who can well afford to buy them. Particularly should we like to see owners of estates in the country take an interest in the subject, and we believe that if the principal landowners in each district were to agree to set aside one of their paddocks as a recognised aeroplane landing place, that it would quite soon popularise flying. It would not be a serious matter to the landowners to do this, and if it were generally followed out, Britain would soon be dotted over with fields, which could very readily be marked with identification signs, whereon an aviator could be sure of alighting without doing damage or incurring the wrath of the owner.

This is merely one more FLIGHT suggestion, but we think there is a good deal to be said for it, and especially would it be useful in the provinces as another means—additional to that proposed by us last week—of encouraging flight in local centres. It is very obvious that flying around an aerodrome is going to be a tame proceeding for those who can fly well, when the novelty of the pastime has worn off. And it is equally obvious that the aeroplane, like the motor car, is after all, merely a vehicle of transport, the primary purpose of which is to carry people and their belongings from one point on land to another.

MODERN IDEAS IN AEROPLANE DESIGN.

Two outstanding, and very notable facts about the flying machines exhibited at Olympia are their adherence to the aeroplane type and the general excellence of their workmanship. There is an almost entire absence of freak machines, and there is scarcely an aeroplane shown that has not been well built.

In commending the conservatism of newcomers we hope we shall not be accused of trying to restrain originality, for such is by no means our intention. Our point of view is merely that the aeroplane is the one type of machine with which practical flight has so far been accomplished, and that it is therefore along these lines that there is most reason to expect to be able to quickly compile useful data. Many inventors of flying machines have imagined that the solution of flight lay entirely in some curious characteristic of their particular *design* of apparatus, entirely overlooking, apparently, the common application of the fundamental principles of dynamics



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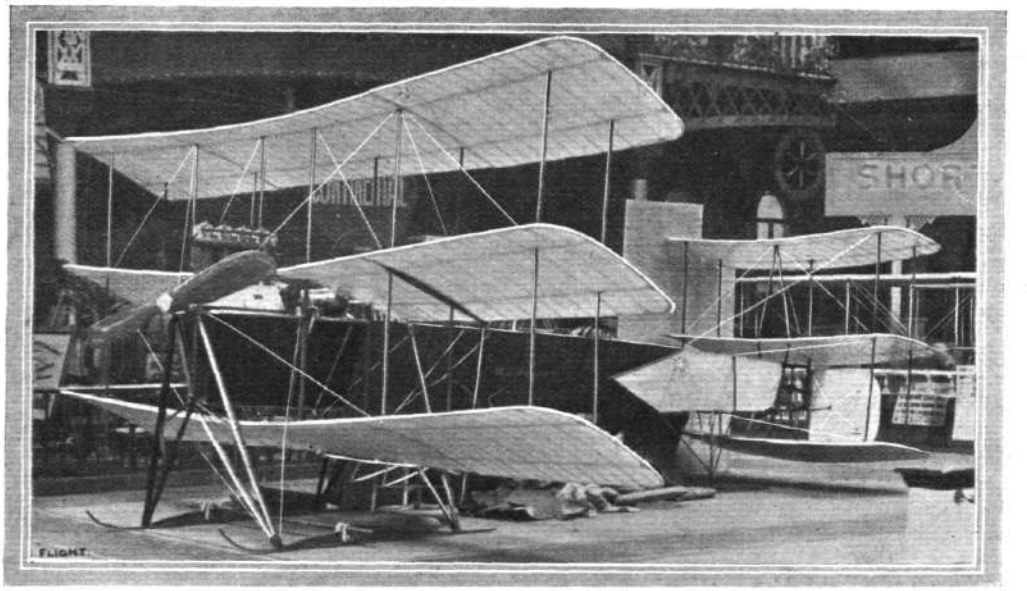
THE PRINCE AND PRINCESS OF WALES AT OLYMPIA.—Our photograph was secured during the inspection of the famous Louis Blériot monoplane. On the stand are also Prince Francis of Teck, Mr. Roger W. Wallace, K.C., Chairman of the Royal Aero Club; the Hon. C. S. Rolls, who drove the Prince and Princess on his car from Marlborough House and back, and explained many points of interest in the exhibits during the Royal party's tour of Olympia; Mr. Edward Manville, President of the S.M.M.T.; and Mr. Norbet Chereau, manager for M. Blériot.



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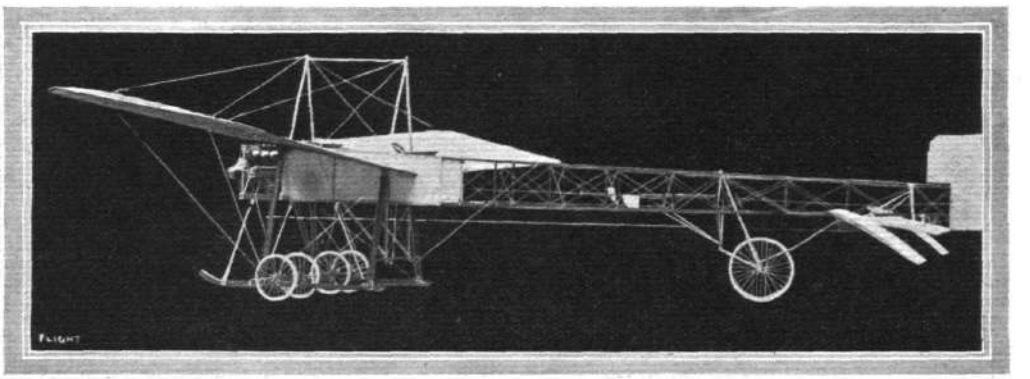
OLYMPIA, 1910.—A. V. Roe's latest triplane. The main planes and the tail planes are pivoted so that the pilot can alter their angles of incidence in flight.

that govern the support of all machines that fly in the air. They have sought to evolve something elaborate rather than to apply their enthusiasm and enterprise to finding out all that there is to know about that apparently simple, but in reality very complicated type of flyer—the aeroplane. It is because practically all the newcomers have more or less adopted the essential features of some successful type of flyer that we have felt justified to pass such encouraging remarks elsewhere about the industry.

Monoplane *v.* Biplane.

At the present Show, for instance, the influence of the Blériot type monoplane is pronounced in the extreme—and this is not unnatural seeing how valuable a commercial asset is the fact that Blériot flew the Channel with such a machine. Monoplanes predominate over biplanes in numbers, but the biplane is by no means ousted. On the contrary, it holds a particularly strong position among aviators of experience in this country. Practically all the successful pilots at the present time are using biplanes, and we fail to observe any indication on the part of Short Brothers, who have had most experience with this type of machine in England, to depart from it in principle. It is impossible to suppose, however, that the energy that is being put into practice with the monoplane on the part of those who are experimenting with it, will fail to materially advance this type of machine, and within the year we hope to be able to chronicle plenty of extended flights by monoplane users.

It is difficult, if not impossible, to really review the pros and cons of the two types fairly at the present time, for, in a sense, very much depends upon the personal fancy of the would-be aviator, who may be prejudiced in favour of one type or the other and, therefore, regard the advantages of the machine of his choice as far outweighing its disadvantages.



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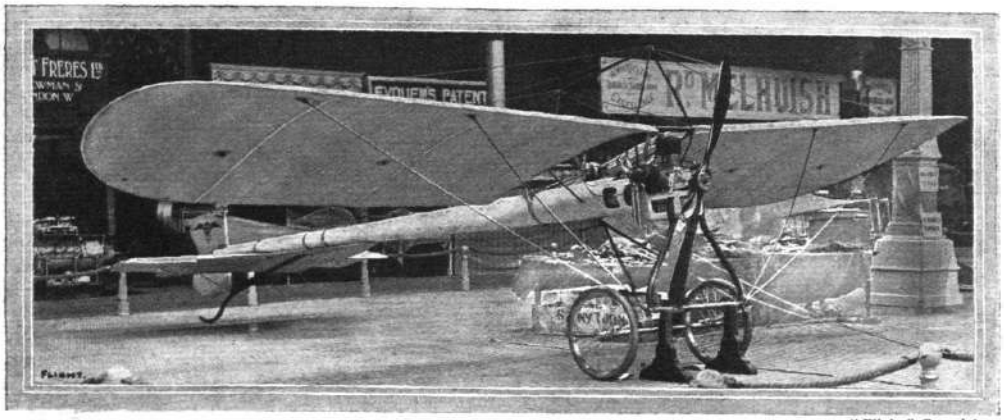
OLYMPIA, 1910.—The E.N.V. monoplane constructed by Howard Wright for Warwick Wright combines timber and steel in the construction of the chassis and frame. The chassis is an interesting example of the "A" type.



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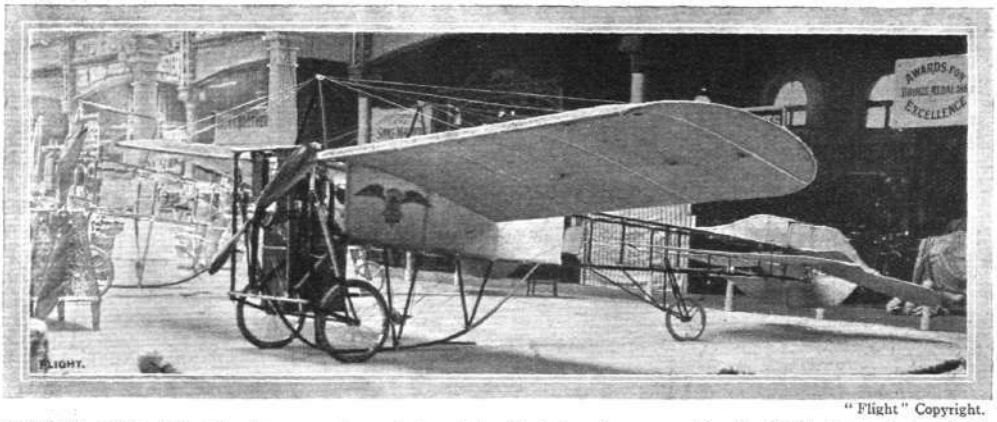
OLYMPIA, 1910.—The Humber monoplane designed by Le Blon is characterised by its dragon-fly body, which consists of a hollow wood boom of tapering circular section. The exterior of the boom is bound with tape.

The great size and weight of a biplane may oppress some with a sense of unwieldiness, but imbue others with an impression of strength and security. The high flight velocities and steep angles of incidence of the monoplane may prejudice these machines with some people, but be considered no drawback whatever by others. Whether a firm be supplying a biplane or a monoplane, or, as in the case of A. V. Roe, a triplane,



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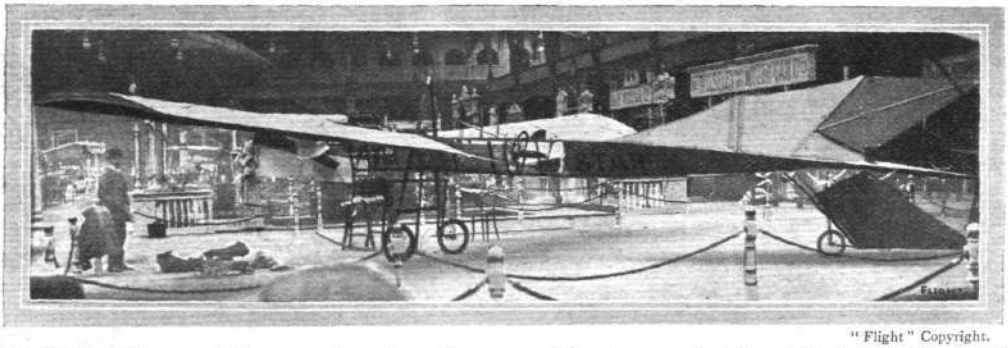
OLYMPIA, 1910.—The Humber monoplane designed by Capt. Lovelace resembles the Blériot type, but embodies many different features, notably the tail and the control mechanism.



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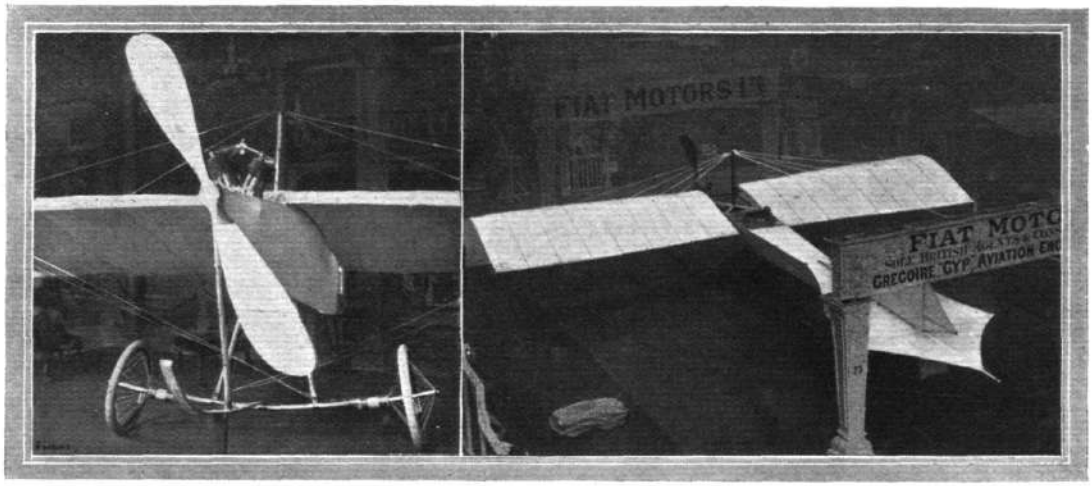
OLYMPIA, 1910.—On the Star monoplane the trailing edges of the wings are flexible, and the four similar pivoted planes forming the rudder and elevator—which comprise the moving members of the tail—can be so manipulated in flight as to produce a torque on the frame for the purposes of maintaining lateral equilibrium.



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View of the very simple chassis employed on the Handley Page monoplane. The natural flexibility of the ash axle constitutes the suspension.

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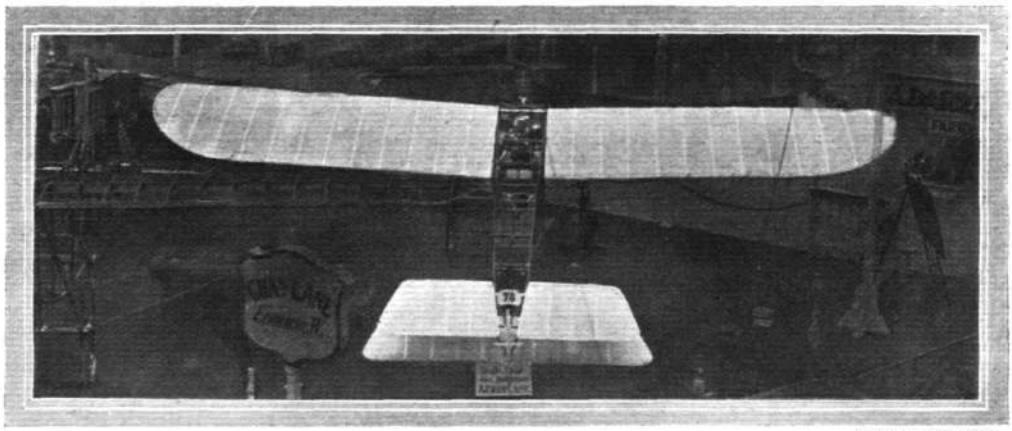
View from behind of the Gregoire-Gyp monoplane, exhibited by Fiat Motors, Ltd. The system of steering is very similar to that on the Antoinette machine.

the machine has at least the elements of practical success, and that after all is the main consideration at the moment when flight is an accomplishment possessed only by a very few. First and foremost for the development of aviation do we need to induce a large and influential section of the community to play an active part in its practice. When aeroplanes are in common use, then may those who have had experience expect to meet with more consideration for departures from the orthodox in design, which by that time they may have evolved as the result of their practical experience with accepted machines.

Good Workmanship.

The excellence of workmanship, to which we have drawn attention as a feature of the exhibits at Olympia, is, as we have maintained, a most important factor in success. In our report of the first Olympia Show we made a point of commending good workmanship for its own sake, arguing that while the designer might have reason for producing an impracticable machine, he had no excuse for exhibiting one that was badly built. In England there is no dearth of good wood-workers, and it is, we consider, the least that a firm can do to turn out a thoroughly sound job. That a machine may get smashed up at the first trial is no excuse for initially building it indifferently. A well-built machine is not only less likely to be damaged, but it is certainly going to be easier to repair. If it is successful at all, nothing but a machine that has been accurately constructed is of any use whatever as a means of obtaining reliable data on which to base future designs; and apart even from these considerations, the safety of the pilot demands the precaution of good workmanship in every detail. It is for these reasons that we consider the obvious attention to high quality in this respect that characterises the exhibits at Olympia, to be such an important feature of the present Show.



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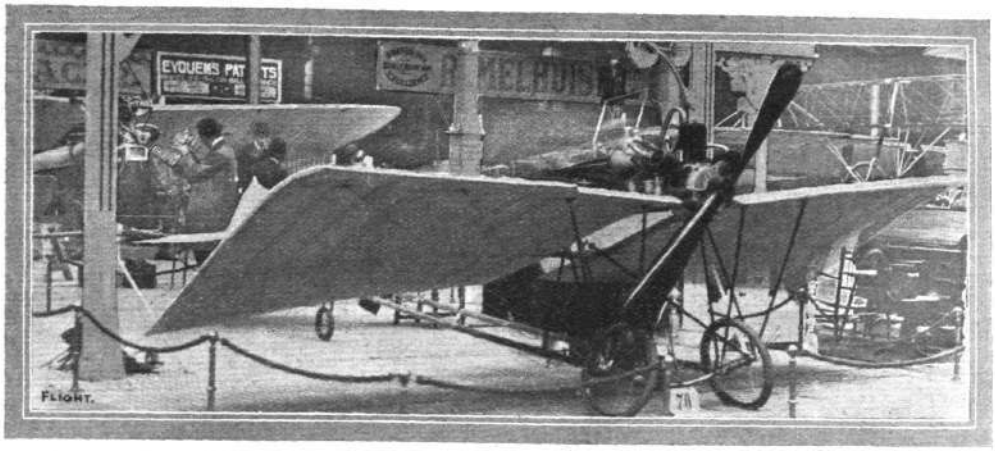
View from above and behind of the Lane monoplane. This is the single-seater; on the left will be noticed part of the skeleton framework of the two-seater.



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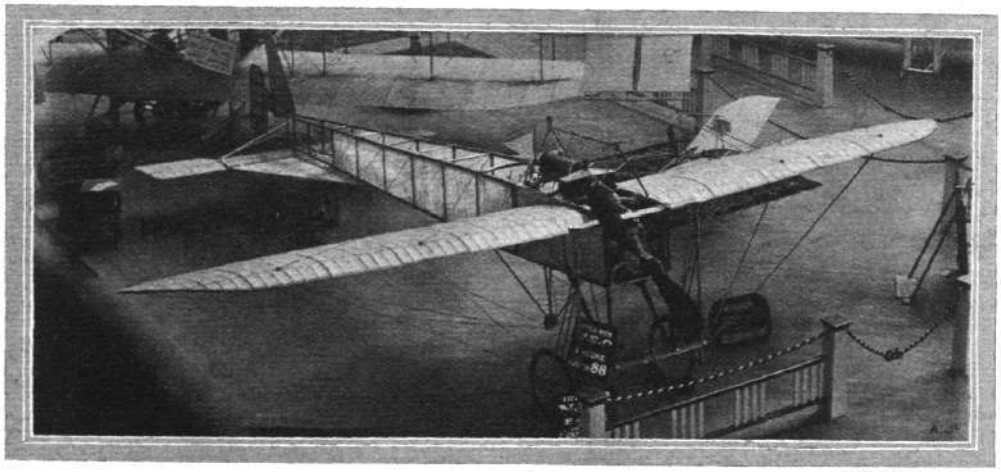
OLYMPIA, 1910.—A light-weight monoplane of the Santos Dumont "Demoiselle" type exhibited by Mann and Overton.



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The Nicholson monoplane, which has been constructed by the well-known coachbuilders, Messrs. Holland and Holland, and follows the lines of the Blériot machine.

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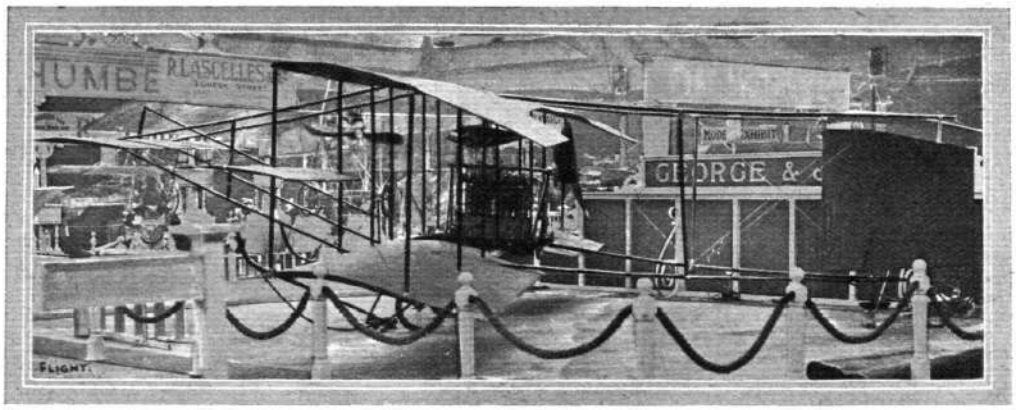
General view of the Spencer-Stirling monoplane, exhibited on the Berliet stand. This is the only monoplane fitted with twin screws.



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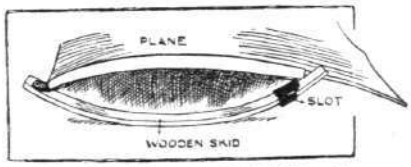
OLYMPIA, 1910.—George and Jobling's biplane. This machine has a monoplane tail and a monoplane elevator. The spars and struts are hollow.

Tail or No Tail.

Turning more to the technical details of design, the more interesting characteristics of the present Exhibition are perhaps not altogether obvious to the casual observer, who may find it somewhat difficult to locate trend in design and specific evidences of progress. Two interesting points that will probably have attracted general attention are the use of the front rudder and a rear tail on the new Short biplane. Both details were evolved in connection with the machine with which J. T. C. Moore-Brabazon won the *Daily Mail* prize, and are not, therefore, strictly speaking, novel, but they represent an important change in design as compared with the machine exhibited on the Short stand last year. The introduction of the tail has the more significance in view of the fact that the Short Brothers, as the British constructors of the Wright biplanes, have had unique experience with the tailless type of machine, and the fact that they have deemed it advisable to fit a tail on their own model is very strong evidence of the value of such a member in assisting to maintain stability. The forward rudder is interesting mainly on account of the fact that it has been suggested that a forward rudder by itself would not be altogether satisfactory, but it would appear from the practical trials of Moore-Brabazon's machine that it possesses no material disadvantages. One advantage that accompanies the forward position is that the rudder is always within sight of the pilot, who thus has all his controlling gear within the range of his personal observation during flight.



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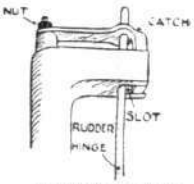
Sketch illustrating how the end skids are mounted on the planes of the George and Jobling biplane.



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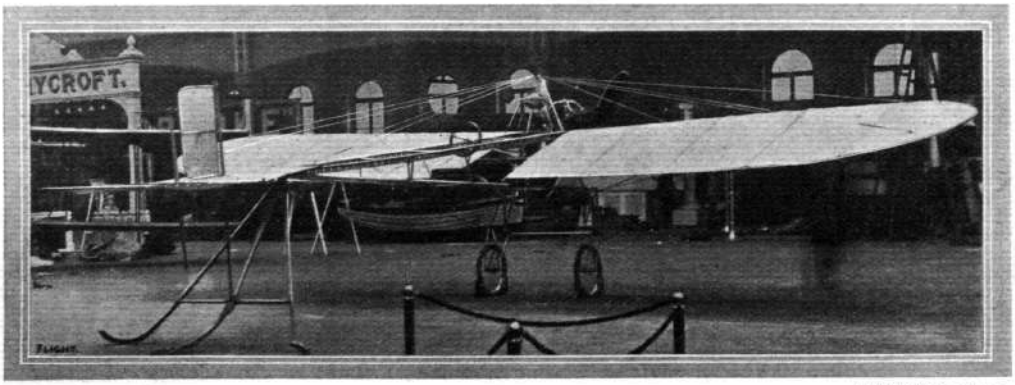
Sketch illustrating an ingenious method of fastening the rudder-hinge to the rudder-post on the Mulliner monoplane.

The Twining biplane—whose designer was represented by one of the smallest models in the model section last year—also has the rudder and the elevator in front of the main plane, but it has no tail.



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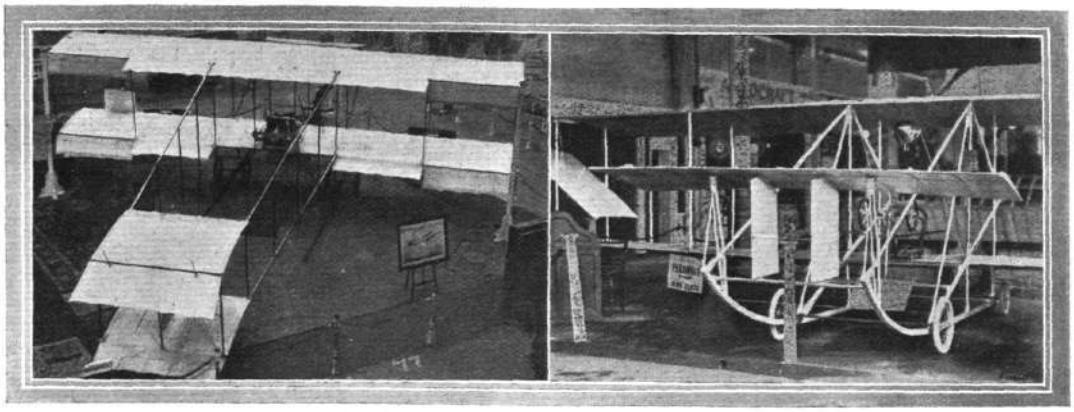
OLYMPIA, 1910.—Lightness is the keynote of the well-finished Mulliner monoplane designed by Gordon Stewart.



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General view of the Farman biplane from behind, showing the hinged trailing edge of the upper tail-plane, which constitutes the principal new feature in the 1910 model.

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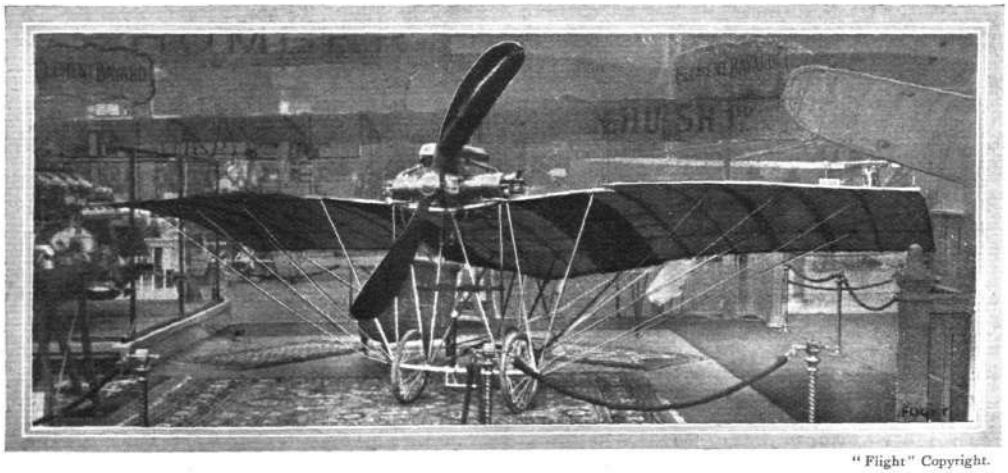
View shewing the elevators, rudders, and one of the balancing planes on the Twining biplane. This machine has no tail of any description.

Fore and Aft Elevators.

On the Henry Farman biplane, which has been imported into this country by Capt. Rawlinson on behalf of the Darracq firm, the trailing portion of the upper tail plane is now hinged and interconnected with the elevator so as to introduce a direct controlling force at the rear of the machine. This interconnection is such that the trailing edge of the tail is raised simultaneously with the leading edge of the elevator, so that the bows of the machine are forced upwards and the tail downwards, simultaneously, when it is desired to alter the attitude of the machine in flight. There is, as will be readily understood, a considerable amount of inertia to vertical displacement on the part of a large tail such as that used on the Farman biplane, and owing to the distance of the tail from the centre of gravity of the machine, the elevator is working under considerable disadvantage as regards leverage if it alone has to tilt the machine.

Systems of Control.

While a great deal of attention seems to be paid to details of the operating mechanism—in connection with which there is a marked inclination to introduce the inclined steering wheel, *à l'automobile*—the majority of manufacturers have taken over the wing-warping, elevator and rudder combination *in toto* from the Wright system. As an indication of capacity for recognising something that is good, the copyists are to be commended, but the control system on aeroplanes essentially presents a field that lends itself to the exercise of originality, and originality may prove to be a very valuable asset when the question of patent rights on wing warping comes to be fought out in this country, if ever such an action should happen to be brought before the courts. It is significant that Short Brothers have adopted balancing planes pivoted to the extreme vertical struts of their machines, and incidentally it may be remarked that they have introduced an extremely ingenious detail in connection therewith, which is referred to at greater length in another article. On the Star monoplane the movements of the tail planes, of which there are four of similar dimensions, are made use of to exert a torque upon the frame, for the purpose of restoring lateral equilibrium. In another combination,



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A genuine Santos-Dumont "Demoiselle" exhibited on the Clement-Bayard stand.

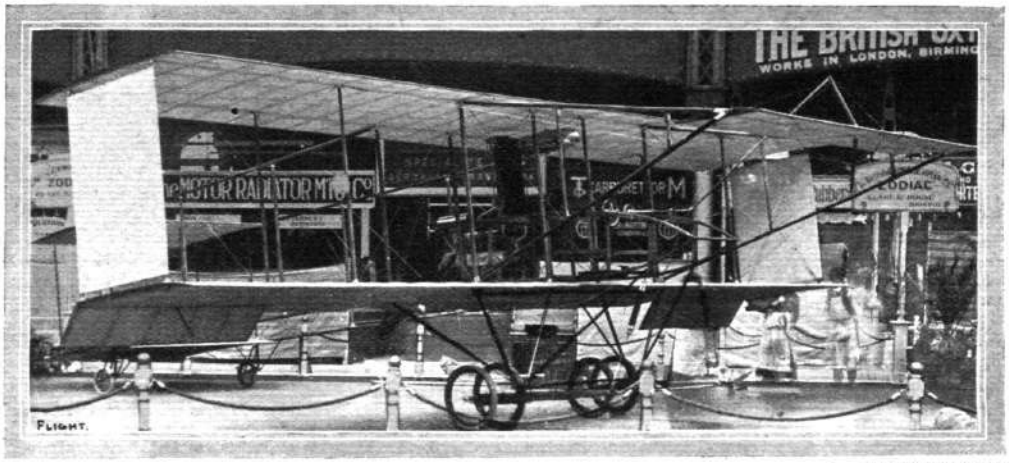
the vertical planes in the Star tail perform the functions of a rudder, while the horizontal members act as an elevator.

Variable Angles and Variable Camber.

There is one detail in aeroplane control to which we expect to see considerable attention being paid later on, and that is the adjustability of the angle of incidence and depth of camber in flight. It is to the credit of A. V. Roe—who is also to be commended for his plucky development of the triplane, of which system the Avro-plane is so far the sole example—that his machines are fitted with planes that the pilot can adjust to any angle of incidence he pleases during flight, and we understand that, in future, provision for altering the camber will also form a feature of his system. The Humber monoplane designed by Le Blon is an actual example of variable camber, the trailing portions of the wings being so mounted that the pilot can flex them up or down.

We are anxious to see practical experiments conducted with machines in which these features figure in the system of control, because we are inclined to believe that they may play an important part in the development of variable speed machines. A cambered aeroplane of fixed form forced through the air above its normal velocity necessarily ascends, but were its camber flattened out and its angle of incidence diminished, it should be possible to attain such higher speeds along a horizontal course without a sacrifice of much efficiency. Doubtless it would involve the use of a variable pitch propeller, but that is another problem. We are inclined to regard a variable angle of incidence and variable camber as somewhat equivalent to the change-speed mechanism of the automobile.

We have coupled the angle of incidence and the camber together in this matter because it seems likely that maximum efficiency will probably be secured as the result of simultaneous variation of the two factors. The absence of reliable data renders it difficult to appreciate what relationship one factor may bear to the other, but we think it likely that experiments may demonstrate one of some considerable importance, and we draw attention to the matter as a suggestion for a line of profitable investigation.



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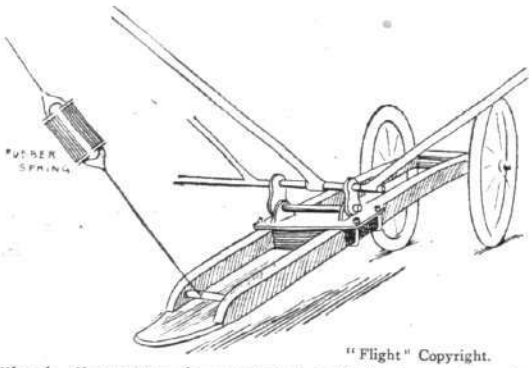
OLYMPIA, 1910.—A characteristic feature of the Zodiac biplane, exhibited by the British and Colonial Aeroplane Co., is the flatness of the camber in the main decks.

Materials of Construction.

Timber is still paramount in aeroplane construction; indeed, the only serious attempt this year to use steel throughout is to be seen on the Humber biplane. Howard Wright, who exhibited an all steel machine last year, has abandoned the principle in favour of timber, but employs hollow steel tubes in certain carefully selected places. He found the steel construction to be strong and light; its drawback lies in the necessity of renewing any member that becomes bent owing to the impossibility of restraightening a steel tube *in situ*. On the Humber monoplane designed by Capt. Lovelace, steel tubes are used for the struts of the main frame.

Of the timber employed in aeroplane construction ash and spruce are the most popular woods. Short Brothers use spruce throughout, but in the majority of cases in which one wood is employed, preference seems to be given to ash, especially by builders of monoplanes. Hickory and American elm, which are favourite woods in America, characterise the Humber monoplane designed by Capt. Lovelace; American elm has also been used in the George and Jobling biplane, which has bamboo outrigger spars.



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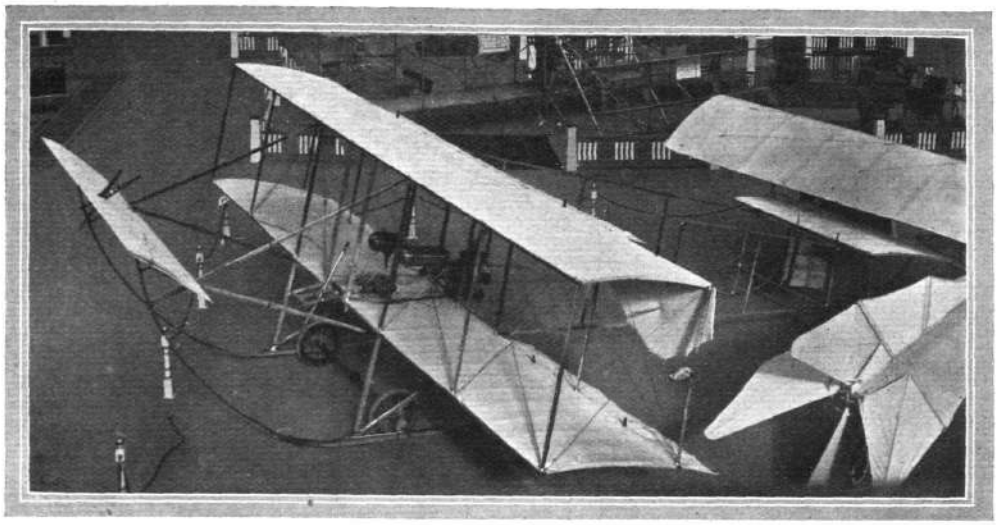
Sketch illustrating the cantilever method of mounting the wheels on the Zodiac biplane.



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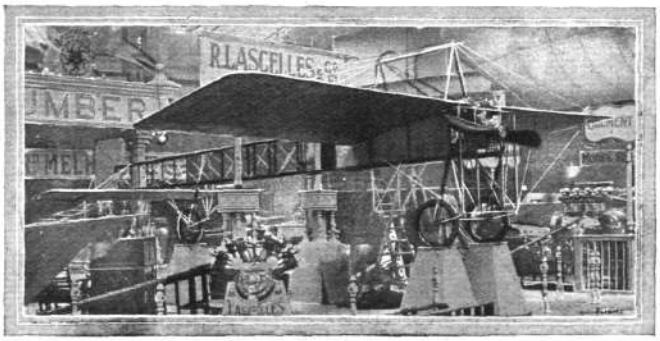
One of the most successful flyers of the day is the new Roger Sommer machine seen above, which was purchased and shown by the Hon. C. S. Rolls as one of the exhibits in the Royal Aero Club's section.

Hollow Spars.

All the spars and struts on the George and Jobling biplane are hollow, but in general there does not seem to have been any particular inclination among designers to introduce this refinement as a means of securing lightness, nor do makers of hollow spars record a very brisk business therein, probably owing to the relative costliness of this form of construction. When flying machines are less damaged by their users there will no doubt be less disinclination to introduce more expensive component parts. An interesting example of hollow wood construction is the dragon-fly body of the Humber monoplane designed by Le Blon; in this case the hollow wood boom has been bound with tape. The vertical struts on the Mulliner monoplane are examples of hollow wood-work.



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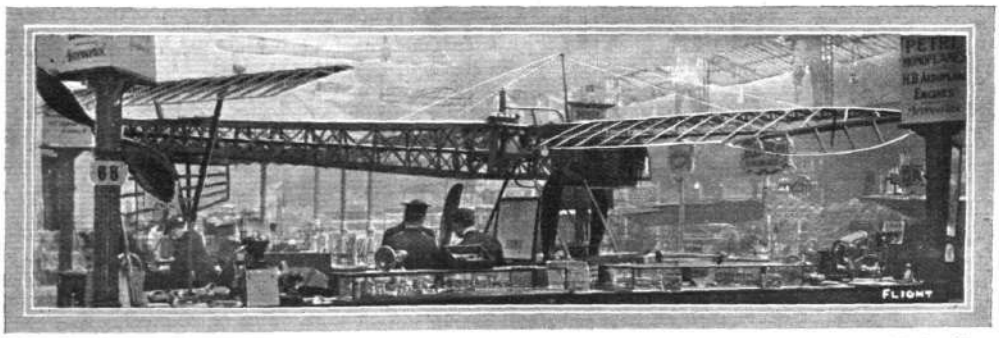
OLYMPIA, 1910.—The Ornis monoplane exhibited by Lascelles and Co. resembles the Blériot type, but is rather larger and somewhat lighter in its construction. It is controlled by an inclined steering-wheel.



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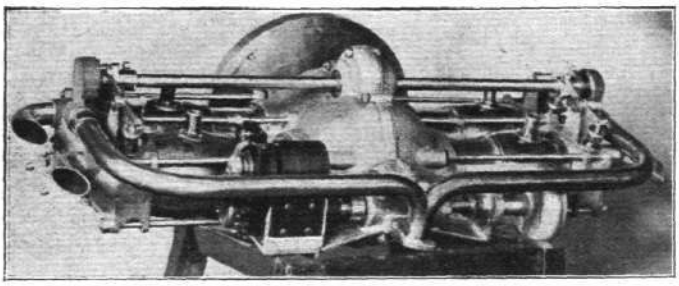
General view of the framework of the Petre monoplane, exhibited by Leo Ripault and Co. A characteristic feature of this machine is the position of the propeller behind the tail.

Chassis Construction.

More attention is probably being given to the design and construction of the chassis of modern aeroplanes than to any other part, and this is very properly so, since the chassis is called upon to do the hardest work. It is that part of the machine where there should be least evidence of sacrifice of material for the sake of lightness.



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A new British aeroplane engine—the Thames—built by the well-known Thames Ironworks Co.

The massive nature of the Short chassis is interesting on this account, more especially if it is compared with some of the lighter designs embodied in machines of which no practical trials have yet been attempted. We have been pleased to observe, too, the widespread recognition of the "A" type of chassis frame, to which we drew special attention in connection with our report of the last Paris Salon, where this design was introduced on the Hanriot monoplane. For strength and simplicity it is, in our opinion, superior to anything we have seen for machines that require a high chassis, as is the case with monoplanes. One of the points in connection with the Short chassis that makes it so interesting is the fact that it is very low owing to the disposition of the propeller, which is so arranged as to enable the lower deck to be close to the ground. This subject has been dealt with at greater length in our article on the Short biplane, which appears elsewhere.

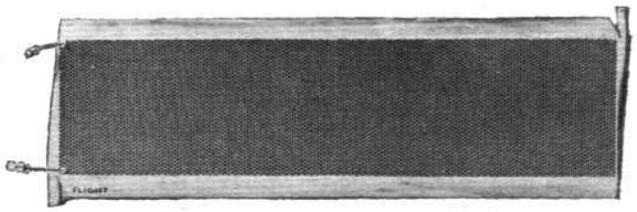
Skis and Wheels.

The obvious advantages of combining wheels and skis for the support of the machine on the ground have been widely appreciated by manufacturers, nearly all of whom have adopted some such combination as that originally introduced by Farman. The Farman device—consisting as it does of two pairs of stout bicycle wheels, each pair mounted on a short axle and lashed to a skid by elastic—is simple and effective, and has been widely copied. Short Brothers, who have adopted the ski and wheel combination this year, have sought to introduce a further improvement in the form of "disappearing" wheels, which can be raised above the level of the skis after the machine has ascended in flight. This operation, which merely involves the simple movement of a lever by the pilot, relieves the wheels of all shock when landing. The Handley Page ash axle is an interesting method of avoiding springs by utilising the natural flexibility of timber for the suspension.

Propellers.

It is a little difficult to sum up the progress that has been made in the design, construction and application of the aerial propeller; especially is it difficult to appreciate any improvement in design on account of the absence of any means of testing the comparative efficiency of propellers other than by their popularity with aviators. And this brings us to a matter of considerable importance that we would like to urge in the present place, although it is somewhat apart from the subject. We should like to suggest how valuable would be a public testing plant for propellers to which manufacturers could submit their devices, and that the National Physical Laboratory is just the sort of Institution where some such apparatus might properly be expected to be found.

Timber is becoming increasingly popular in the manufacture of propellers, a very large number of which are now made with layers of different kinds of wood, in order, so it is supposed, to produce a maximum of strength and lightness. Walnut, mahogany and spruce is an example of the combination employed. In most cases such propellers are very highly finished and have fine sharp edges; Short Brothers on their new biplane exhibit a propeller that is the very antithesis of such refinement, having bluff edges and a matte surface. As in the case of the struts and spars on the Short biplane, which are also only touched up to the extent of rounding off the corners, so also in the case of their propellers has this firm come to the conclusion that there is not enough practical advantage in the adoption of stream-line form to compensate for the additional expense that it involves in manufacture. Many wooden propellers are now reinforced with fabric glued to the surface, which improves their life in bad weather and also probably increases the strength of the blade without adding any appreciable weight.



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The Zimmerman radiator is an example of the real honeycomb type, being constructed of circular brass tubes 1 mm. in thickness. These tubes are expanded at the ends so as to give the necessary water space between them when they are set together. These radiators can be made as light as 30 lbs. to cool a 50-h.p. engine.

In respect to the position of the propeller on the machine, the tractor-screw (or propeller in front position) still predominates in monoplanes, owing to the obvious difficulty of placing a single propeller behind, elsewhere than as an excrescence of the tail—which place, by the way, has been adopted on the Petre monoplane exhibited by Leo Ripault. It will be interesting to watch how the propeller propels on this machine.

One of the most interesting features in the propulsion of modern aeroplanes is the apparently satisfactory action of the high-speed propeller, which has enabled manufacturers to dispense with mechanical gear-reduction by coupling the propeller direct to the crank-shaft. This fact has been one of the most important factors in the simplicity of construction of the new Short biplane.

FLIGHT

THE NEW "SHORT" BIPLANE.

Leading Particulars of the Short Biplane, 1910 Model.

General Dimensions.—Areas—Main planes, 282 sq. ft.; fixed tail (hor.), 21½ sq. ft.; (vert.), 10 sq. ft.; elevator, 55 sq. ft.; rudder, 10 sq. ft.

Lengths.—Span, 31 ft. 8 in., chord, 5 ft. 4 ins. (aspect ratio, 6); camber, 3¼ ins., situated about 24 ins. from leading edge; leverage of rudder, about 8 ft. 6 ins. from leading edge of main planes; gap, 4 ft. 4 ins.; overall length, 31 ft.

Materials.—Timber, spruce; fabric, North British Rubber Co.

Engine.—35-h.p. Green.

Propeller.—Make, Short; diameter, 7 ft. 6 in.; material, spruce.

Weight.—Machine, 390 lbs.; engine, 225 lbs.; driver, oil, petrol, 200 lbs.; radiator, tanks, piping, 42 lbs.; total flying weight, 857 lbs.; loading (all weight supported on main planes) 3 lbs. per sq. ft.

Speed of Flight.—45–50 m.p.h.

System of Control.—Balancing planes, elevator, rudder.

Price.—£650.

THAT fact which above all others makes the new Short biplane interesting, is that its design is the outcome of actual experience in flight. During the last twelve months, Short Brothers have been collecting information from the practical aviation that has been actively in progress at Eastchurch and Shellbeach, which has proved invaluable to them, and it may be said that all their experience to date is embodied in the design and construction of this latest machine that they have developed. What makes it even more interesting, is that this machine is by no means radically different from the larger biplane with which Mr. Moore-Brabazon won the *Daily Mail* prize. That flyer was the first of the Short models to be actually flown, and the similarity between the two seems to us to be good cause to compliment the firm on the success that attended the scientific thoroughness with which they went to work in the first instance.

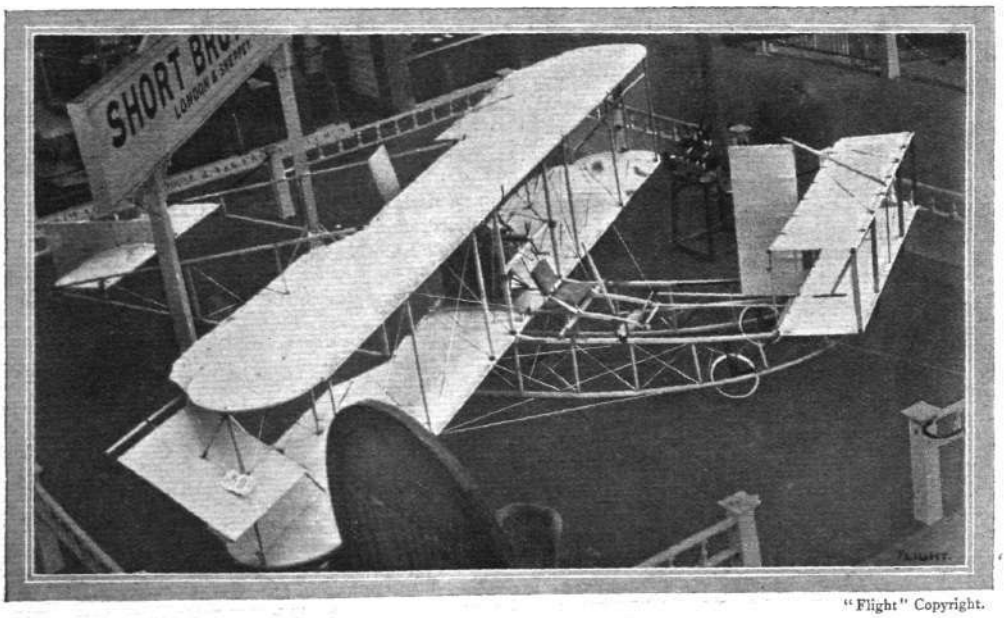
Leading Characteristics.

The latest Short biplane is characterised by its apparently massive construction, yet on examining it more closely it will be seen how scientifically the bulk of the material has been disposed. That this is the case is proved by the low actual weight of this machine, the framework and fabric weighing only 390 lbs. One fact that has stood out among all others as the result of practical experience is the absolute necessity for making the chassis portion of the machine and the engine bearers as strong as possible. These are, pre-eminently, the massive parts of the new Short biplane.

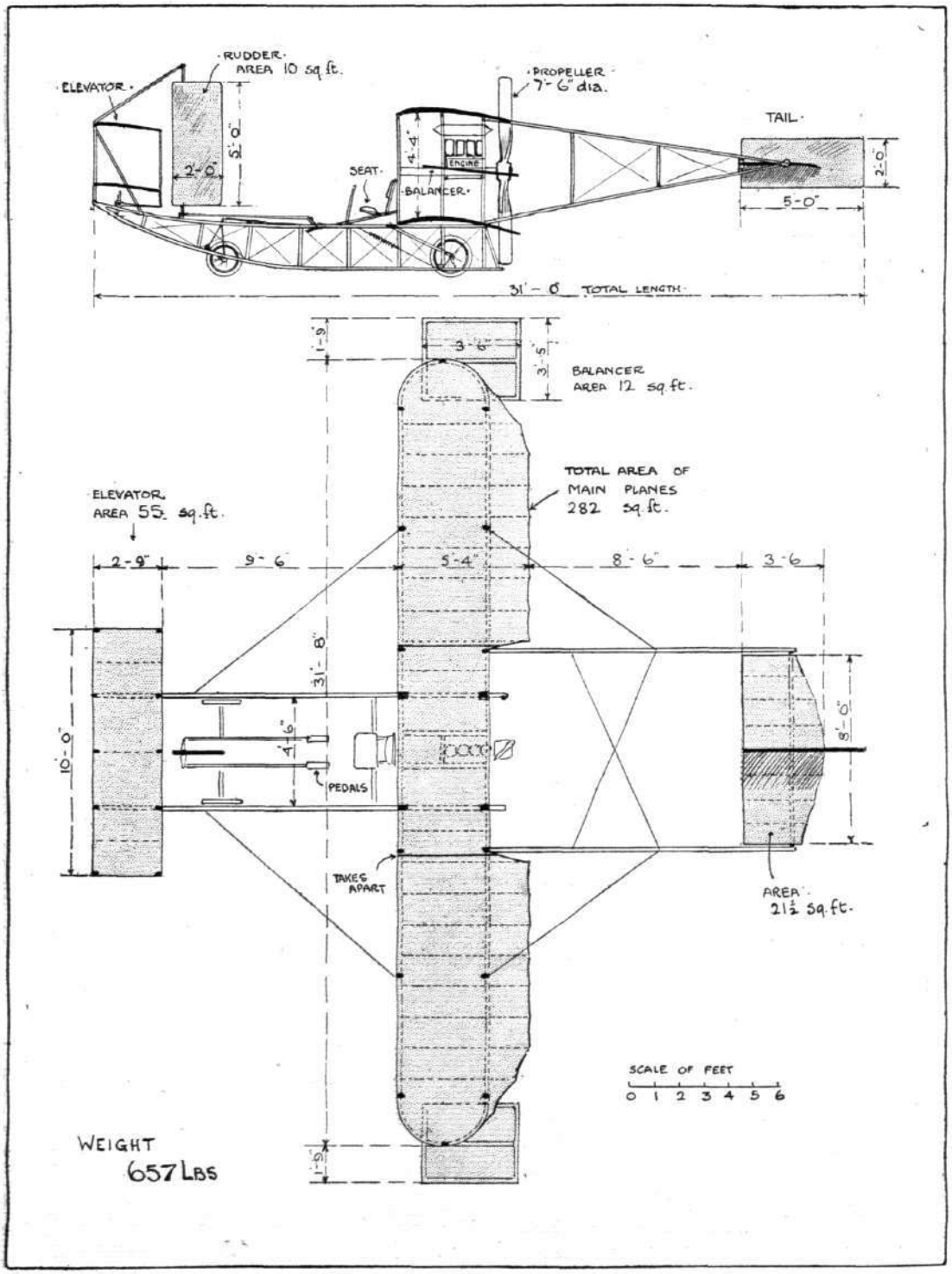
The chassis itself is a particularly interesting and very simple piece of work, consisting of a pair of lattice girders forming landing skis. These members owe their rigidity mainly to the fact that they are not very deep, and it is in fact a characteristic of the machine, distinguishing it from the majority, that the lower deck is very close to the ground when the machine is on the earth. Short Brothers regard this as a most important feature of their design, their experience having taught them how difficult it is to construct a high chassis that is sufficiently rigid to stand the terrific severity of the shocks to which it is likely to be subjected by beginners, who are sometimes apt to suddenly "drop" their machines from a height of possibly ten feet straight on to the ground

Centre of Gravity.

Another outstanding characteristic of the Short design in this particular model, is the position of the engine



General view from above of the new Short biplane, with fixed tail, front rudder, and balancing-planes among the special features.



THE NEW "SHORT" BIPLANE.—Elevation and plan.

midway up the gap, instead of being supported on the lower deck as is the more common practice. This position has resulted from the desire to have a low chassis and a single direct driven propeller of large diameter, but it seems to us that there is even a theoretical advantage in placing the engine in this position resulting from its tendency to raise the centre of gravity.

In any biplane there must be two main centres of pressure and resistance as the result of using two planes a considerable distance apart. Commonly the disposition of the principal masses locates the centre of gravity nearer to the lower centre of pressure than to the upper, with the result that it probably increases the inertia factor that militates against lateral stability, and also gives rise to the phenomenon of "kick up" that may occur when the

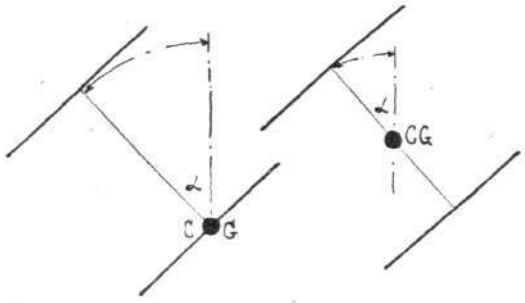
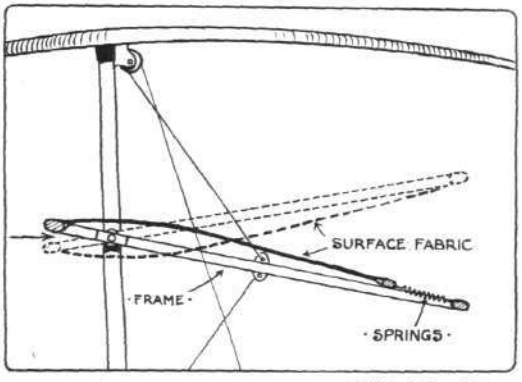


Diagram illustrating the comparative movement caused by a cant at equal angular displacement when the centre of gravity is on the lower deck and midway in the gap.

engine is stopped in flight. Both the effects are probably caused by inequality in the leverages forming the couple represented by the two principal centres of pressure about the centre of gravity. The phenomenon of "kick up," which consists of an upward tilting of the front part of the machine automatically resulting from an interruption of the drive in flight, is a manifestation of the superior leverage of the centre of resistance of the upper plane, or it may be regarded as the more direct action upon the lower plane of the momentum of the principal mass—which comes to the same thing.

In respect to the matter of lateral stability mentioned above, it seems as if any position of the centre of gravity that is not coincident with the resultant of the two principal centres of pressure—which position is, presumably, midway in the gap—must be regarded as ascentric and, therefore, as possessed in some degree of the inertia factor that is generally recognised as detrimental to the stability of any such system.

This latter point has not yet been thoroughly discussed, and it would be helpful if some such attention as our readers recently gave to the principle of the dihedral



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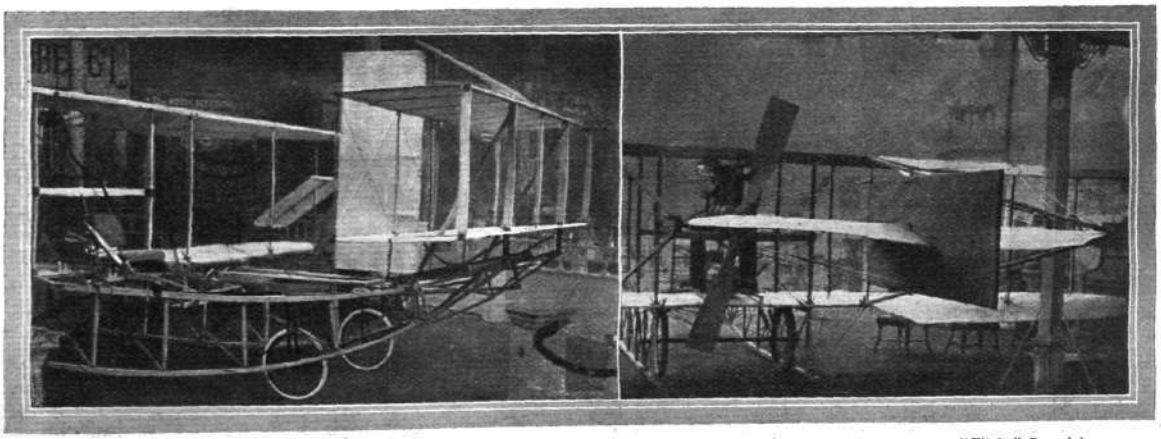
Sketch illustrating the action of the balancing planes on the Short biplane. The method of mounting the fabric so that it automatically cambers under the air pressure is one of the most important of the patented devices on this new machine.

angle, which we broached in our description of the Antoinette monoplane, were devoted to a discussion of the centres of pressure and centre of gravity in biplanes. Diagrams are given herewith to facilitate reference, and the point to which special attention is drawn is that the inertia to recovery on the part of a system in which the centre of gravity is located on the lower plane is greater than when the centre of gravity is located midway in the gap, owing to the fact that the inertia of a mass is proportionate to the square of its radius from the centre of rotation.

(To be concluded.)



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View of the elevator and rudder on the Short biplane.

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View of the tail on the Short biplane.

BRITISH FLIGHT ENGINES.

"THE GREEN."

(*Continued from page* 188.)

Cam-Shaft and Valves.

ONE of the gear-wheels aforementioned drives a vertical spindle enclosed in an aluminium tube (Fig. 8).

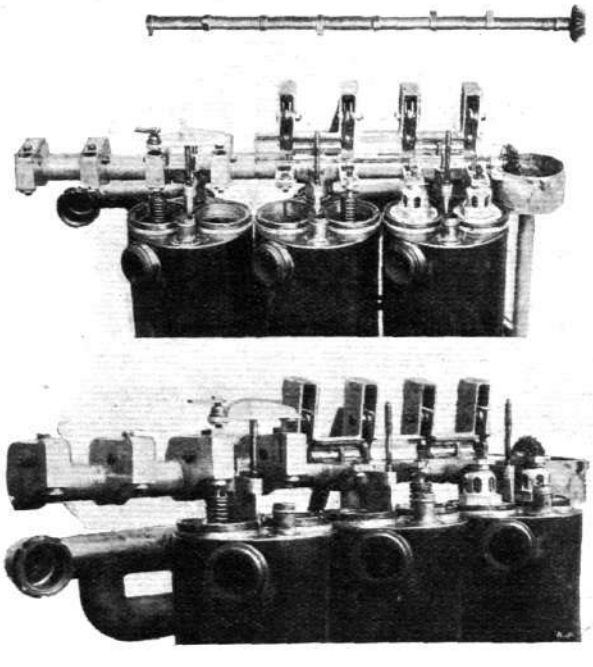

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Fig. 8.—Detailed views showing the valve mechanism on the Green engine. Overhead, the cam-shaft is shown separately, and on the right the vertical shaft that drives it is also illustrated.

The upper end of this spindle terminates in a bevel-wheel that drives the overhead cam shaft. The bevels are enclosed in an oil-tight box fitted with a detachable cover. The cam-shaft on the Green engine is enclosed in an aluminium case that provides four long bearings for its support. The case that encloses the cam-shaft is entirely detachable from the engine (Fig. 10), and it is also made in two parts, which, however, make an oil-tight tongue-and-groove joint when *in situ*. The cam-shaft casing is supported above the cylinders by four brackets, similar in design to bearing-brackets, and having detachable caps. When these caps are loosened the cam-shaft casing can be rocked bodily round the cam-shaft without disturbing the latter member, and the advantage of this will be understood when the arrangement of the valve and valve-operating mechanism is described. The brackets that support the cam-shaft casing are themselves held in place above the cylinders by the same nuts as are employed to secure the water-jacket; in fact the bearing-bracket casting forms a kind of washer between the nut and the copper.

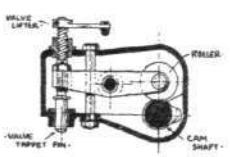

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Fig. 9.—Sketch showing the rock-lever, by means of which the cam-shaft operates the valve.

The inlet and exhaust-valves in the Green engine are interchangeable, being identical in design and construction. The valves themselves are of the mushroom type, and are mounted in cylindrical cages (Fig. 10). Complete with its spring, each forms a self-contained unit that drops straight into place in the cylinder casting, where it is centred in the correct position by means of a small feather key, and is held down by a curiously shaped aluminium nut that forms a dome over the valve-spring. The valve-cage makes a seating

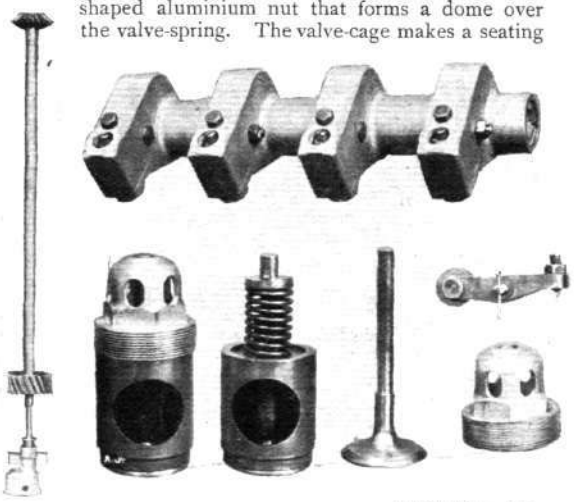

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Fig. 10.—Detailed views showing, above, a portion of the cam-shaft casing, and, beneath, the valve and its cage.

upon the cylinder casting of a similar character to that made by the valves upon the cage itself.

The valves are operated from the cam-shaft by means of rock-levers (Fig. 9) that are pivoted on extensions of the cam-shaft casing, each rock-lever is also individually enclosed by this same extension, which forms a bridge between the cam-shaft casing and the dome above the valve-chambers, upon the top of which it is pressed down by a yoke piece. The precise arrangement of this rock-lever in its little box forms the subject of one of the accompanying sketches (Fig. 9), from which it will be observed that there is a small intermediate member between the adjustment screw on the end of the rock-lever and the valve-stem that the rock-lever is intended to operate. This intermediate member takes the form of a short pin, which slides up and down vertically in its bush. The principal utility of this intermediate member

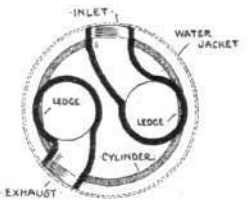

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Fig. 11.—Sectional sketch showing the ledge that prevents the valves from falling into the cylinders on the Green engine.

is that it enables the rock-lever box to be kept oil-tight.

In the latest design, the yokes that hold the rock-lever boxes down upon the valve-domes are fitted with valve-lifters (Fig. 9), in the form of quick-acting screws that are interconnected and controlled by a wire from the pilot's seat on the aeroplane.

Accessibility has been made a feature of the Green engine, and it is interesting and instructive to investigate the arrangement of the valve-operating mechanism already described from this point of view. If it is necessary to adjust the lift of the valve the operation consists of removing one of the yokes that hold down the valve-tappet boxes. This uncovers an orifice in the top of the box through which the adjustment screw on the end of the rock-lever is accessible (Fig. 10). If it is necessary to remove a valve, or all the valves, the same yokes are released, and the caps on the brackets that support the cam-shaft casing are loosened. The rock-lever boxes, which form part of the cam-shaft casing, can then be hinged back clear of the valve-domes, which are then unscrewed to enable the valves to be lifted out complete with their cages.

If a valve should break, special precautions have been taken to minimise the likelihood of damage resulting from the mishap. The valve-stems are turned down to two different diameters, the larger diameter extending from the head of the valve for a distance of about an inch up the stem, where it abruptly changes to the smaller diameter. It is the smaller part of the valve-stem that fits the guide; the larger part of the valve-stem does not enter the guide at all, but it is surrounded by a sleeve forming an extension of the valve-cage casting. This sleeve projects down as close to the head of the valve as possible. If the valve-stem breaks it is probable that it will fracture in the smaller part of the stem, and it is therefore anticipated that the larger part of the stem will always remain intact with the head in the event of breakage, and on this assumption a very simple device has been introduced to prevent the head of the valve from falling into the cylinder. The valve-chambers are so situated that they very slightly overlap the walls of the cylinder, which causes a small ledge (Fig. 11) to be formed where the wall of the valve-chamber merges into the wall of the cylinder. It is this ledge that stops the valve falling into the cylinder in the event of a fractured stem, and it is the aforementioned sleeve on the valve-cage that renders the ledge effective for this purpose by guiding the thicker part of the valve-stem that by assumption has remained intact with the valve-head. But for this sleeve the valve-head would, of course, tilt sideways and in all probability succeed in slipping past the ledge.

(*To be concluded.*)

AIRSHIP NEWS.

British Army Dirigible Out.

A SERIES of trials were carried out with the new Army dirigible on Tuesday morning, and, in spite of the strong breeze and mist, several evolutions were successfully carried out. The airship described circular movements over Farnborough Common, the altitude varying between 500 and 1,500 ft., and Capt. Carden and Lieut. Waterlow, who were in charge, twice brought it to the ground once or twice in order to test the landing lines. The engines worked well, and it is expected that a speed of 50 miles per hour will be obtained shortly.

The Naval Dirigible.

IN reply to questions in the House of Commons last week, Mr. McKenna said that the Admiralty had not erected any garage or shed for the dirigible which is being built at Barrow; but there was the garage there which belonged to Messrs. Vickers, Sons and Maxim. This had been built for the special purposes of the Admiralty, and it was hardly likely the Vickers-Maxim Company would turn them out. When experiments had been made with the new balloon they would see the precise kind of shed required for it, and the Admiralty would then be prepared to take the necessary steps.

The Cesar "Aeroplane-Mixte."

A STRANGE craft was taken out at Issy for its initial trials on the 11th inst. This was the Cesar "Aeroplane-Mixte," a tandem biplane, above which is mounted a cigar-shaped gas-bag of 100 cubic metres capacity. The motor is a 50-h.p. Prini-Berthand, and the trials are said to have surpassed all expectations, but up to the present no details are obtainable.

"Col. Renard" Out Again.

THE repairs and reconstruction being completed, the military dirigible, "Col. Renard," was given a five hours' trial trip on the 2nd inst. Starting from Beauval, the dirigible cruised above the military parade-ground for some time, and eventually made a wide circle over the surrounding country.

"Parseval V" Out for a Trip.

ON the 1st inst. "Parseval V," the smallest of this type of airship yet built by Major Parseval, was given a long test, and flew from Bitterfeld to Tegel, traversing 75 miles in about 3½ hours. The balloon is 30 metres long and is of 1,200 cub. metres capacity. Lieut. Stelling was in charge, accompanied by one passenger and a mechanic, and on landing expressed his satisfaction with the behaviour of the new craft, and especially with regard to its elevating-gear.

"Clouth" Sails for Two Hours.

ON the 1st inst. the dirigible "Clouth," which has been temporarily occupying the military airship shed at Bickerdorf, by Cologne, had to vacate those quarters. An ascent was therefore made with the vessel, and after cruising above the forest of Cologne for two hours, it landed at Nippes. On the 4th the gas was being transferred to an ordinary balloon, "Clouth V," when the latter was caught by a sudden gust of wind and blown away, eventually coming to earth in Belgium.

Zeppelin Arctic Expedition.

AT a meeting of the Zeppelin Arctic Expedition Committee presided over by H.R.H. Prince Henry of Prussia on the 5th inst., it was resolved to make a request to the German Government for the services of the Imperial exploration steamer "Poseidon" for 10 or 11 weeks. The members of the expedition intend to start for Spitzbergen on July 1st and will then by the aid of the "Poseidon" study the conditions for airship landing.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Committee Meeting.

A meeting of the Committee was held on Tuesday, the 15th inst., when there were present: — Mr. Roger W. Wallace, K.C., in the chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Capt. A. H. W. Grubb, D.S.O., R.E., Professor A. K. Huntington, Mr. V. Ker-Seymer, Mr. J. T. C. Moore-Brabazon, Mr. C. F. Pollock, Hon. C. S. Rolls, Sir Charles D. Rose, Bart., Mr. J. Lyons Sampson, Mr. Stanley Spooner, Hon. Arthur Stanley, M.P., and joint secretaries, Capt. E. Claremont, R.N., and Harold E. Perrin.

Election of Chairman.—Mr. Roger W. Wallace, K.C., was unanimously elected chairman for the current year.

New Members.—The following new members were elected :—

D. W. A. Barton.	J. Lindsay Scott.
Willoughby Bullock, F.R.G.S.	Robert Masson Smith.
Commander R. Muirhead Collins, R.N.	William Summers.
	Charles Temperley.
George A. Hensley.	Lieut. R. Arncott Wilson, R.N.
H. Gilbey Pirere.	

Annual Meeting.

The annual meeting was held on Thursday, the 10th inst., and a full report will be found below.

Committee Election.

The following members were elected to fill the nine vacancies on the Committee :

Mr. Ernest C. Bucknall.	Sir Charles D. Rose, Bart.
Col. J. E. Capper, C.B., R.E.	Mr. A. Mortimer Singer.
Mr. V. Ker-Seymer.	Hon. A. Stanley, M.P.
Mr. J. T. C. Moore-Brabazon.	Mr. Roger W. Wallace, K.C.
Hon. C. S. Rolls.	

Baron de Forest £4,000 Prize.
Under the Rules of the International Aeronautical Federation.

Baron de Forest has offered through the Royal Aero Club of the United Kingdom a prize of £4,000, to be competed for under the following conditions :—

1. The winner to be the aviator who, from a point fixed upon by himself, and approved by the Royal Aero Club, flies the longest distance from England to the Continent, the distance to be measured from the starting point to the point of descent.

2. No part of the machine shall touch land or water during the flight.

3. The competition to be open from January 1st, 1910, until December 31st, 1910.

4. The flight must be accomplished by means of a machine of the type designated "heavier-than-air."

5. The complete machine, *i.e.*, the motor, planes, propellers, and all other parts thereof, must have been entirely constructed within the confines of the British Empire. This shall not be held to apply to raw material.

6. The entrant, who must be the person operating the machine, must be a British subject, and domiciled in Great Britain or the Colonies or dependencies thereof for a period of at least two years prior to January 1st, 1910.

7. The flight must be commenced in the presence of official observers appointed by the Royal Aero Club.

8. Formal notice of entry must be sent to the Secretaries, Royal Aero Club, 166, Piccadilly, W., not less than one month before the proposed flight, and the entrant must comply with all the regulations as to notices, observations, and other details issued from time to time by the Royal Aero Club.

9. In every case, notification of the first attempt to be made, under these conditions, must reach the Royal Aero Club, 166, Piccadilly, W., not less than forty-eight hours prior to such attempt, and in the case of all subsequent attempts, not less than twenty-four hours' notification must be given.

10. The entrant must supply satisfactory evidence of previous flights before making any attempt under these conditions.

11. The competitor must supply satisfactory evidence of the exact point of descent, signed by two witnesses, whose signatures must be attested.

12. In accordance with the rules of the International Aeronautical Federation, the entrant must be a member of, or obtain a permit from, the Royal Aero Club of the United Kingdom.

13. Should any questions arise at any time after the date of entry as to whether a competitor has properly fulfilled the above conditions, or should any other question arise in relation to them, the decision of the Committee of the Royal Aero Club shall be final and without appeal.

14. Each competitor agrees to waive all claim for injury either to himself or his apparatus, and agrees to assume all liabilities for damage to third parties or their property, and to indemnify the Royal Aero Club against any such claims.

E. CLAREMONT, CAPT. R.N.,
HAROLD E. PERRIN,
Joint Secretaries.

166, Piccadilly.

ROYAL AERO CLUB GENERAL MEETING.

QUITE a solid gathering of members were in evidence at the Club on Thursday last week, when the tenth annual general meeting took place at the headquarters, 166, Piccadilly, under the chairmanship of Mr. Roger W. Wallace, K.C., thus once more emphasising the keen interest which has already developed in aeronautical matters.

The Chairman, after congratulating the members upon the honour which had recently been conferred upon the Club by His Majesty the King, and the convenience of the new Club premises, pointed out that the membership since the last meeting, when it was between 400 and 500, had more than doubled, it being now over 1,200, and fresh members were coming up for election at every meeting. He hinted at the possibility, in consequence, of an early increase in the subscription.

Continuing, Mr. Wallace referred to the growth of clubs in the provinces, and the scheme of association with the Royal Ae. Club, which enabled them to share in the benefits of the International Federation, and in all aeronautical subjects of general interest. Several of the principal clubs, notably in Scotland, had already associated with them, and negotiations were pending with several others. He then dealt at length with the International Federation, and the selfish position sought to be taken up by certain sections in France in regard to the holding of meetings to the detriment of other countries. With the firm support of other members of the Federation, the situation, however, had been saved, and England had gained much by the dignified position which the Royal Aero Club had maintained throughout the unseemly proceedings.

Referring to the Olympia Show, he said the first British Aero Exhibition organised by the Society of Motor Manufacturers and Traders, and supported by this Club, opened on March 19th of last year, and was eminently successful. There were only eleven full-sized flying machines at this Show, whereas the Show which opened last week was the biggest Aero Show ever held, there being thirty full-sized aeroplanes exhibited, besides a large number of very interesting models.

With regard to flying generally in England, great progress was being made. Most of the prizes offered during the past year had been won, notably :—

£1,000 *Daily Mail* Prize for a flight of 1 mile, won by Mr. J. T. C. Moore-Brabazon.

Salomons Cup, for ½ mile flight out and home, on a machine "heavier-than-air," won by the Hon. C. S. Rolls.

Aero Club Short Flight Prizes :—

£25 for a flight of 250 yards, won by the Hon. C. S. Rolls.

£50 for 1 mile circular flight, won by the Hon. C. S. Rolls.

£25 for a flight of 250 yards, won by Mr. J. T. C. Moore-Brabazon.

£25 for a flight of 250 yards, won by the Hon. Maurice Egerton.

£50 for 1 mile circular flight, won by the Hon. Maurice Egerton.

There were still a large number of prizes open for competition, principally the £10,000 prize, so generously given by the *Daily Mail*

for the London to Manchester flight, also another valuable prize of £4,000 offered by Baron de Forest for the aviator who, starting from London, crosses the Channel and makes the greatest distance the other side, and the Michelin Cup value £500 and £500 in cash for five years.

There were also two International aviation meetings to be held in England this year, both of which were obliged to offer £8,000 in prizes, making in these five events alone over £30,500 to be won in England. There would also be several National aviation meetings held in England during the year, at which prizes up to £2,000 per meeting would probably be offered.

Dealing with the successful Blackpool meeting and the sport of the year, last year, he said, the usual balloon contests took place in the Hurlingham Club grounds, including the International Balloon Contest on May 22nd, when fourteen balloons ascended, being three from Frankfort, one from Belgium, and ten English. It was a Point-to-Point Race. The "Hare and Hounds" Balloon Race took place in July, in which eight balloons took part including the "Hare," and which was won by Mr. Singer in the "Satellite." It was worthy of note that one of the members of the Club, Mr. John Dunville, had recently made an historic flight by crossing the Irish Channel, and this, strange to say, in a balloon which was picked up at sea.

Continuing, Mr. Wallace said the Club had at the present time two flying grounds, one at Shellbeach, which had a clubhouse attached, and an auxiliary one at Eastchurch, which latter was due to the generosity of one of the members of the Committee, Mr. F. K. McClean. Both grounds were in the Isle of Sheppey and easy of access from London. There are sheds which members can hire on both grounds and the Club are at the present moment negotiating for a large ground near London and also another one in the Midlands.

Two teams of members of the Club had entered for the Gordon-Bennett Balloon Race and the Gordon-Bennett Aviation Cup, which would take place in America in October.

Most of the principal flyers, such as Blériot, Farman, Latham, and Paulhan had been entertained by the Club and presented with medals. He was glad to say that two of our English aviators, Mr. J. T. C. Moore-Brabazon and the Hon. C. S. Rolls, both of whom were members of the Club, had been granted the first Pilot-Aviators' Certificates issued by England.

He thought it was a matter for congratulation that the Royal Automobile Club, the Aerial League of the British Empire and the Aeronautical Society were so friendly. The R.A.C. had always shown them the greatest friendship and assistance and he thought it was a matter of hearty congratulation that this good feeling existed, and he trusted that it would only strengthen with time, so that the four clubs might always show a solid front in case of troublesome times for either of them.

The great historical event of the year was the crossing of the Channel by M. Louis Blériot on a monoplane, the 25th July, 1909. His descent on Dover cliffs was fortunately witnessed by one of the committee of the Club, and the Club had been able, through the generosity of one of their members, Mr. Alexander Duckham, to put up a very handsome memorial on the spot.

Mr. Mortimer Singer, who, as a member of the Club, went out to represent England at the Heliopolis Meeting, as they all regretted to know, met with rather a serious accident, which was a great loss to the Club, as they had great hopes of Mr. Singer winning some events for England. He was, however, glad to say that Mr. Singer was progressing favourably, and by a telegram received from him he hoped to fly again shortly.

Finally the Chairman, after thanking the Committee of the Club and its officers for their devotion to the Club's interests, reminded the members that the Club membership card gave admission to Hurlingham for all balloon contests, and also to the Aero Exhibition. They gave admission last year to the flying meetings at Rheims and Blackpool, and they hoped to make similar arrangements for the members at the two English International meetings this year.

The following members have been elected to fill the nine vacancies on the Committee :—Mr. Ernest C. Bucknall, Col. J. E. Capper, C.B., R.E., Mr. V. Ker-Seymer, Mr. J. T. C. Moore-Brabazon, the Hon. C. S. Rolls, Sir Chas. D. Rose, Bart., Mr. A. Mortimer Singer, the Hon. A. Stanley, M.P., and Mr. R. W. Wallace, K.C.

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MODELS AT OLYMPIA—JUDGES' AWARDS.

ON Wednesday, the Judges of the Royal Aero Club made an inspection of the models on view at Olympia, and made the following awards, which are subject to confirmation by the Committee. The prizes offered by the Aerial League for models suited for naval and military scouting purposes if built on a full-size scale were not awarded :—

No. 54 (J. Urlwin), model monoplane, fitted with petrol motor, for investigation purposes, awarded Motor Union bronze medal (highest award in section). In section devoted to models fitted with petrol engines.

No. 38 (G. W. Pepys Goodchild), one-tenth scale model monoplane awarded Royal Aero Club silver medal (highest awarded in section) for workmanship. Awarded M.U. cup for the best exhibit by a M.U. (Aviation Section) member.

No. 19 (A. Gaitz-Hocky), model monoplane, awarded Royal Aero Club bronze medal for workmanship.

No. 10 (A. E. Creese), device for indicating to the pilot the direction of cant of an aeroplane in flight. Awarded M.U. bronze medal (highest award in section) for an aeroplane accessory.

No. 44 (G. P. B. Smith), **No. 66** (M. Jones), awarded M.U. bronze medal (highest award in section) for toy aeroplanes which were flown in the presence of the Judges.

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PROGRESS OF FLIGHT ABOUT THE COUNTRY.

Aviation Association of Ireland (HOTEL METROPOLE, DUBLIN).

ON Tuesday, March 8th, at the College of Science, Dublin, Mr. J. B. Dunlop being in the chair, a discussion was held on the subject of "Gliders."

Mr. Dunlop opened and explained a particularly light form of structure, on the bicycle wheel plan, but using strips instead of wires, the use of the latter being deprecated by him.

Dr. Lilly showed a method of superposing multiple planes, in which there was no "interference" and yet the structure need not be very high. The object of the idea was to make the machine more compact and narrower and still retain a sufficient surface, all of which made the machine more manageable.

The various sides of the subject were then discussed by various members, and several models being shown helped to contribute to the success of a most interesting evening. A vote of thanks was passed to Mr. Dunlop.

Sheffield and District Aero Club (36, COLVER ROAD).

AN error crept into the report last week in connection with the model competitions. The size for models is 3 ft. 6 ins. *minimum* (not maximum).

Members are requested to note that in view of the increasing membership, the Committee have decided that the usual method of calling meetings by post will be discontinued. Members will take the intimation of meetings in future from FLIGHT. Some model aeroplane trials took place on the Sheffield United Football Ground on Monday afternoon, 14th inst. In spite of gusty weather some good flights were seen, the longest being measured straight as 330 ft., the machine being a "Finbat," flown by Mr. Richardson. Other good flights were 196 ft. and 244 ft. by Cody models. Some interest was also caused by the flying of two huge war kites on one line, at a tremendous height.

The Secretary will be pleased to receive from manufacturers show-cards, &c., to be affixed in the club's aero works.

Women's Aerial League (227, STRAND, W.C.).

GREAT assistance has been rendered to the League by the action of the Royal Aero Club of the United Kingdom in kindly allowing the use of a table beside the Club Stand at Olympia for their literature, and the officials of the Women's Aerial League have been able to give information as to the aims of the League to many prospective members. Forthcoming events include :—

Drawing Room Meeting at Mrs. Chapman's, 20, Rosary Gardens, S.W., Thursday, March 24th, at 4. Tea and speeches.

In pursuance of their policy to assist in establishing aviation as a science in this country, the Women's Aerial League will present their silver medal to the student who gets the highest marks at the examination in aeronautics held this week by Mr. Blin Desbleds at the Regent Street Polytechnic.

This is the first examination in the subject held in Great Britain, so that particular interest is attached to it.

AVIATION NEWS OF THE WEEK.

Royalty at Olympia.

As last year, H.R.H. the Prince of Wales again manifested his interest in aviation by paying a visit to the Olympia Show, and this time he was accompanied by the Princess of Wales. The visit was paid on Monday and the Royal party were received by H.S.H. Prince Francis of Teck, Mr. E. Manville, President of the S.M.M.T., Messrs. Chas. Jarrott and S. F. Edge, the Vice-Presidents, and Mr. Roger Wallace, K.C., Mr. Julian Orde and the Hon. C. S. Rolls. Considerable time was spent in examining the various exhibits, and on leaving, the Princess of Wales was presented with a souvenir in the shape of a handsome gold model of a Blériot monoplane mounted on a marble plinth.

Roe Triplane at Brooklands.

ON Friday of last week Mr. A. V. Roe made four short flights at Brooklands, the best being about half a mile in length.

Collier Monoplane Trial.

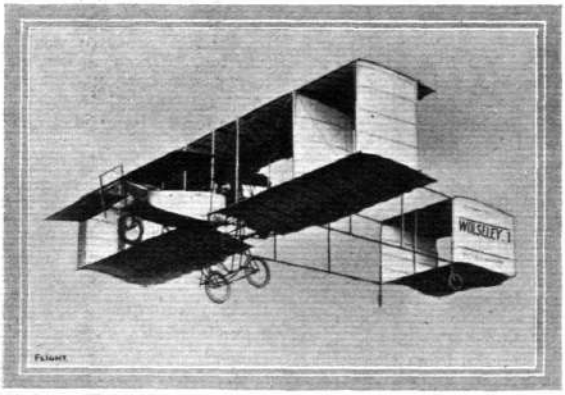
THE first trial with the Collier monoplane, which it will be remembered is of the Blériot type, took place on the 7th inst., when, after several long runs to test the motor, Mr. H. A. Collier succeeded in getting the machine to rise from the ground, and it flew for about half a mile along Plumstead Marshes.

Captain Rawlinson Flies at Barking.

USING a similar Henry Farman biplane to that which he is exhibiting at Olympia, Captain A. Rawlinson flew for about five miles at the Handley-Page flying ground at Barking last Sunday afternoon. The machine is fitted with a four-cylinder Darracq engine having horizontal opposed cylinders.

A Monoplane at Monmouth.

MR. C. H. PARKES, of Monmouth, has just completed a monoplane which embodies several ideas of his own, although in the main it follows on the Blériot lines, and has an elevator in front, instead of at the rear. The machine has a lifting surface of 200 sq. ft.



"WOLSELEY No. 1."—The above photograph of M. de Baeder flying at Chalons on the Voisin aeroplane, "Wolseley No. 1," fitted with a 50-60-h.p. Wolseley flight motor, is the subject of a charming postcard which is being issued by the Wolseley Co. The occasion of the picture was when de Baeder won his four prizes in one day for flying on this machine.

To Fly Round the Needles.

IN connection with the international flying meeting which is to be held at Bournemouth from July 6th to 16th, one of the prizes is to be £2,500 for a flight out to sea, round the Needles and back to Bournemouth.

Route Book for Aviators.

SPEAKING at the Aerial League meeting the other day, Capt. Cave-Brown-Cave said that in conversation with the officer who will command the new naval dirigible he asked: "What are you in need of most?" The reply was "A book of aerial directions for navigation over this country." Such a book is now being compiled by the Aerial League.

Gordon-Bennett Aviation Cup.

TEN entries have been received by the Aero Club of America for the Gordon-Bennett Aviation Cup, the venue for which has yet to be settled upon. Great Britain, France, and the U.S.A. have each entered three machines, while Italy will send one.

Doings at Pau.

BEFORE allowing any of his pupils to attempt to actually fly it is usual for M. Blériot to insist upon a course of lessons with the machine running on the ground, so that the budding aviator may make himself thoroughly acquainted with the control movements. M. Lorraine, however, determined to ignore this precaution and ventured aloft on the 10th inst., but he lost control of the machine when at a height of 30 feet, from which the monoplane fell. It was seriously damaged, but the aviator escaped with only a cut on the head. They have now a "Flying Dutchman" at the Blériot School, the monoplane belonging to M. de Maasdik having been so named.

Flying at Cannes.

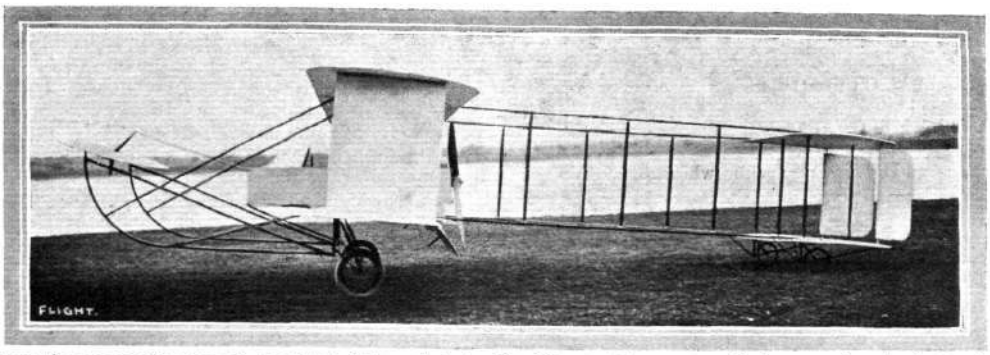
SEVERAL of the competitors who intend taking part in the meeting at the end of this month have been practising at Cannes. Popoff made two short flights on his Wright on the 10th, and de Virel was also trying his Gyp monoplane, while on Saturday last Popoff flew for 1·2 kiloms. at a height of 25 metres.

Mr. Latham to Visit Russia.

IT is announced from St. Petersburg that arrangements have been made for Mr. Latham to carry out exhibition flights on the Kolomiaggi Racecourse there. This is the best aerodrome available, as the police authorities refuse to allow the use of a magnificent ground at Tsarskoe Selo. It is probable, too, that the police will insist on Mr. Latham keeping strictly within the limits of the aerodrome. If permission can be obtained Mr. Latham wishes to fly to Kronstadt. Should these exhibitions prove successful similar meetings may be arranged for Moscow and Warsaw.

Doings at Issy.

VERY little has been doing at Issy during the past week or so. MM. Busson and Noel have been trying their Blériots, and M. Jacques de Lesseps has been making further experiments with the "Frégate," illustrated in our issue of the 26th ult. Mdlle. Dutrieu is continuing her lessons on the "Demoiselle," while the brothers Regy have been experimenting with a monoplane built to their design by Messrs. Peugeot.



From the above side view of the latest biplane built by Mr. Maurice Farman it will be seen that the design has been considerably simplified. A noticeable feature is the boat arrangement which shields the aviator from the wind.

Ae.C.F. Doings.

A PILOTE-AVIATEUR certificate has been formally issued to Mr. Claude Grahame-White, and pilote-aeronaute certificates to MM. Blondel and Georges Baus.

According to the annual report the membership now stands at 1,500, an increase of 470 during the year, and while last year 600,000 francs were distributed in prize money, over 400,000 francs have already been put up for 1910.

New Ae.C.F. Prizes.

AT a recent meeting the Committee of the Aero Club of France decided to offer six new prizes, one of 1,000 francs and five of 500 francs each. The conditions will be announced shortly. At the same time the Committee passed the regulations for the 1,000 francs prize offered by M. Jacques Poliakoff for a gliding flight of one minute with the motor stopped.

New Management at Juvisy.

IT is reported that a new society has been formed to take over the management of Port Aviation at Juvisy, and that the directors, who are said to be well-known sportsmen, will completely transform the flying ground.

M. Levavasseur Rejoins the Antoinette Co.

AFTER five months, both MM. Levavasseur and Gastambide have settled their differences with the other members of the board, and rejoined the Antoinette Co. M. J. Gastambide will be president of the board and managing director; M. Levavasseur, technical director; and MM. Ciolus and Robert Gastambide, managers.

The C.A.M. and the French Trade.

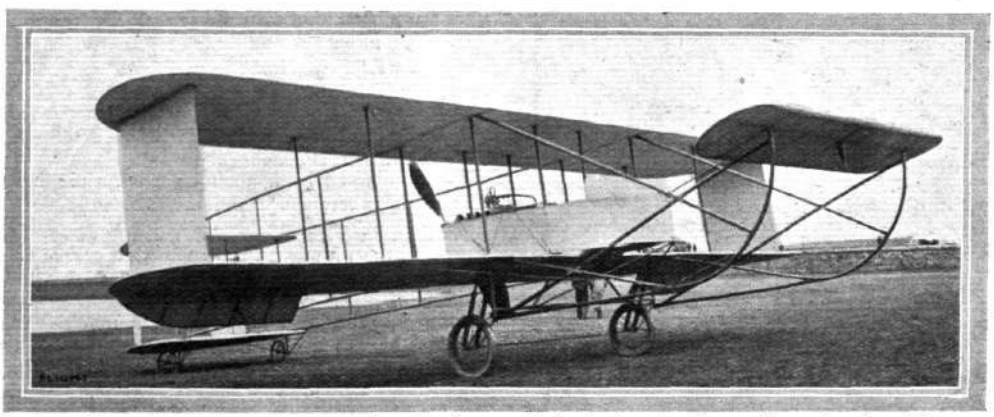
APPARENTLY the Commission Aerienne-Mixte is not always treated with that deference which it desires, even in France, and there is trouble brewing between that august body and the Chambre Syndicale des Industries Aeronautique, because the former refuses to admit to its meetings the delegates of the latter, they claiming to be one of the constituent parties represented on the Commission.

French Flight Motor Trials.

THE series of trials with aviation engines, which are to be held in the A.C.F. laboratory on April 4th, have drawn 13 entries. They are divided into two classes, the first including two Gnomes, Farcot, Costa de Cockborne, Vergo, Rebour, Lemale, Aster, Chenu and Rossel-Peugeot. The three in the second class are Chenu, Dechantes and Gnome.

Capt. Engelhardt at St. Moritz.

ON Tuesday morning Capt. Engelhardt, on his Wright biplane, flew for 32 mins. above St. Moritz, and thus won the Kurverein aviation prize. The altitude of the St. Moritz lake is 6,000 ft.



The latest Maurice Farman machine seen from the front, and clearly showing the special construction of the prow. The single propeller is driven by an 8-cyl. 50-h.p. Renault motor.

Molon at Havre.

MOLON seems to be complete master of his Blériot monoplane now. On the 11th inst. he flew for 50 kiloms. over the Bleville plain at Havre in the face of a strong wind, and was only compelled to come down by a drenching downpour of rain. On the 12th inst. he was flying for 1 hr. 24 mins., during which his maximum altitude was 250 metres.

Sommer Carries Two Passengers.

A NOTEWORTHY feat was carried out by Sommer on his new biplane on the 8th inst., when he carried two passengers, MM. Bouvier and Petrowsky, for 34 mins. The next day M. Sommer made another of his cross-country excursions, flying across to Sedan from Mouzon. On the 10th inst. Paillette, M. Sommer's first pupil, made several short flights, the best being 2 kiloms. in length.

Capt. Burgeat a Pilot.

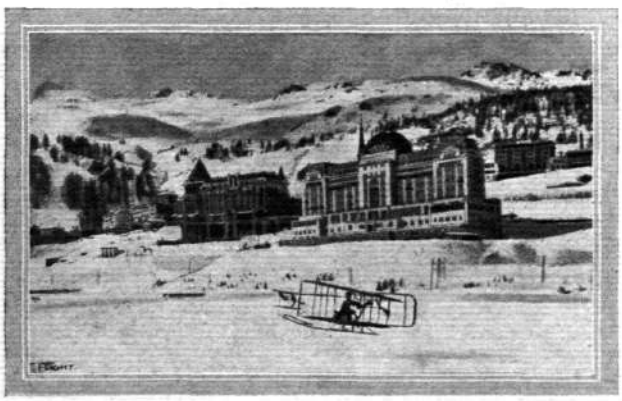
ON the 9th inst. Capt. Burgeat, who was one of the first men in France to purchase an Antoinette monoplane, made the third of his qualifying flights for a pilote-aviateur's certificate. He flew three times round the three kilometre course at Chalons and landed in front of his shed.

Henry Farman School Busy.

LAST Saturday was a busy day for the Farman school, and it was a noticeable fact that only pupils of this school were flying. Frey, Crochon, Cammerman, and Christraens were each trying their machines, while Van den Born gave lessons to Chevalier, Lamine, Nicolas, Kinet Wiesotsky, Osmont and Captain Gibbs, and finished up with a cross-country flight, lasting about fifteen minutes. In the afternoon Van den Born took his wife for a long trip in the "central blue." Henry Farman himself was busy during the day making tests with his new machine.

Zig-Zag Flying.

HAVING quite recovered from the effects of his accident, Legagneux was flying on M. Bellot's Voisin on the 8th inst. and gave a spectacular display during a quarter of an hour's flight. Rising to a height of 50 metres he flew round Chalons Camp for some time, and then repeatedly varied his altitude, sometimes rising very high and then gliding down to within a short distance of the earth.



Captain Engelhardt flying over the snows on his Wright machine at Saint Moritz.

Rougier at Monte Carlo.

HAVING shown that it was possible to fly from the Quay at Monte Carlo to Cap Martin and back, Rougier continued to make it almost a daily jaunt. He did it for the fourth time on the 8th inst., but on the following day, by way of making a change, he first flew to Cap Martin, and then, after circling three times over the sea, he headed for the mountains behind the town and was lost to sight after crossing La Turbie. He came back round the Tête du Chien, and then after some more manœuvring over the sea landed on the quay, the flight having lasted 29 minutes. The next day Rougier again varied his excursion by flying over Cap Martin, continuing to Mentone before he turned on his homeward way.

Grade to Fly at Leipzig.

IT is reported from Leipzig that arrangements have been made with Herr Grade to give a series of exhibition flights on the old cycle racing track, which is to be transformed into an aerodrome.

Herr Grade is at present teaching four pupils at Bork. On the 11th inst. he was flying at an altitude of 75 metres.

Wright Flyers at Berlin.

AT the Johannisthal flying ground at Berlin on the 9th inst., Keidel, on a Wright machine, made seven flights with a passenger, each of about five minutes' duration. Dorner also had a trial, but after flying for ten minutes he landed suddenly from a height of 20 metres, with the result that the machine was badly smashed, although the aviator escaped with a few bruises.

Herr Neumann brought out his new machine, which has eight wings and two propellers; but, unfortunately, two of the wings and one of the propellers were damaged, and so the trials had to be postponed.

Siemens-Schuckert Biplane Smashed.

THE Siemens-Schuckert biplane came to grief on Saturday last while experiments were being conducted with it on the Bornstedt field, near Berlin. Bourcant, the designer of the machine, had made a flight of a kilometre in a straight line when he determined to try a passenger flight. For this purpose two fellow employees took their seats, one on each side of him. All went well for about 150 metres, when the motor stopped, and at the same time a violent gust of wind caught the machine. This caused it to drop to the ground and turn turtle, throwing out the occupants. Two of them escaped with slight injuries, but the third, an engineer named Rau, had his leg pinned down by the heavy 50–60-h.p. motor, severely injuring the limb.

Flying in Canada.

MR. D. C. FRASER, Governor of Nova Scotia, and Major Maunsell, of the Canadian Militia, witnessed flights with the Baldwin-McCurdy biplane at Baddeck, on the 13th inst. In all, eight flights were made, the total distance covered being about 20 miles, while the average altitude was between 50 and 100 ft.

Paulhan in New York.

ON the 12th inst. Paulhan made a couple of flights, each about two miles in length, at Long Island, one at a height of about 600 ft., and the other at an altitude of 1,000 ft. During these trials, Wilbur Wright, accompanied by his lawyer, was an interested spectator, and took particular note of the way in which Paulhan controlled his machine.

On Monday Paulhan made a flight of about 15 miles in length, during which he flew out to sea at a height of 500 ft.

CORRESPONDENCE.

**** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents asking questions relating to articles which they have read in FLIGHT, would much facilitate our work of reference by giving the number of the letter.

NOTE.—*Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.*

AERONAUTICS FOR THE NAVY.

[405] I quite agree with your correspondent, Mr. Griffith Brewer, that a sudden descent in a gale would wreck a dirigible. Also that a dirigible cannot keep the air indefinitely. But why should it? Gales do not blow indefinitely; nor does it follow that because a gale happens to separate the dirigible from its parent ship, that the dirigible's fuel supply is going to run out, or that when the gale drops it will not have sufficient for its return, or be near a friendly ship or land. Granted that its fuel has been exhausted in fighting the gale, is it *bound* to descend while the gale still blows? I think not; and it appears probable that an airship may be able to avoid the gale by rising above it. But what of the aeroplane under similar conditions? The dirigible need not descend into the sea if its fuel is used or its engine stops, it can still drift. But the aeroplane? Well, picture to yourself one caught in a gale at sea, trying to alight on the deck of its parent ship. The steamer rolling, pitching, and yawing about, with the green seas tumbling over its decks, and clouds of stinging spray flying mast high, and aloft, the aeroplane battling with the wind against fierce uneven gusts and flaws! No, sir. I know something of the sea, and I do not think such a thing can be done. And what happens to the aeroplane if it cannot alight on its parent ship? It will have to keep on battling with the gale until its fuel is used up or the aeronaut exhausted, when it will glide gently into the sea. And then? Exit aeroplane and aeronaut! For no aeroplane, even if fitted with floats, would stand the buffets of even a moderate sea. Nor can the aeroplane carry as much fuel as the airship. It has no reserve of buoyancy; if its fuel goes, or engine stops, it must glide down, possibly to destruction. If a plane breaks, or its steering jams, it will fall from the heavens like a shot duck. Not so the dirigible, and this is where, for over-sea work, its superiority over the aeroplane lies. I quite agree that it would be futile to attempt to tow a dirigible in a gale, and I only mentioned this because Mr. Brewer advocated the use of a balloon when the weather conditions were unfavourable for aeroplane work, and said that surely a dirigible could, under the same conditions, stand as much as a balloon.

Many people seem, when comparing dirigibles and aeroplanes, to assume that the former type is incapable of being further improved. The aeroplane, as it is at present, requires a whole lot of improvement before it can be as useful as the dirigible at the present day. What are the chief drawbacks of the dirigible which are against its use as a naval scout? First, its liability to lose gas; second, its leeway in a breeze; and, third, its limited quantity of fuel.

As to the first, I believe in some of the latest vessels the gas will last for nine or ten days, and further improvement of the fabric will extend this period; as it is, the dirigible has ten days' buoyancy while the aeroplane has none. As to the leeway, this is reduced every time the speed of the vessel is increased, and it does not seem impossible that the vessel should be given enough speed to render it able to hold its own with at least a moderate gale; it is simply a question of mechanics, a question which concerns the aeroplane even more, for here the engine is not only motive power but replaces buoyancy. Lastly its air-keeping capacity, or fuel capacity; this surely can be overcome, and it seems to me that the dirigible can and will be able to carry more than the aeroplane. An aerial scout will not be required to carry more weight than its crew, no passengers, no bombs; the equivalent weight of these will be made up in fuel, for a scout need not fight, it must run, for it is an eye, not a fist. The dirigible possesses this advantage, its parent ship need not leave the fleet, it can remain behind while the dirigible scouts miles ahead, or if the war be in narrow waters its base may be on land.

Pin Mill. HAROLD R. INGERSOLL.

PILOT-AVIATORS' CERTIFICATES.

[406] I saw in your edition of FLIGHT for January 29th, a list of those flying men who had up to that date been granted Ae.C.F. Pilote-Aviateurs' Certificates. I was wondering, on looking through the list, if, when an aviator has once secured a certificate, he is allowed to drive any machine at all besides the one on which he obtained, and to still hold the certificate for this last machine. Thus in the case of Paulhan, is he considered qualified to use any other machine with adeptness besides his original Voisin machine? Also allow me to suggest that there should be published in your excellent paper at certain periods, say once in every one or two months, a list of aviators as they get their certificates. Wishing success to your paper.

Winchester. "INTERESTED."

A MODEL AERO CLUB FOR HAMPSTEAD.

[407] As there are many in Hampstead who are interested in flight, I venture to propose the formation of a Hampstead Model Aero Club for the promotion of aviation in Hampstead, and for the control of model aero competitions in this district. Will all "Hampsteadonians" who are interested in this scheme communicate with me through the agency of FLIGHT? I have taken in FLIGHT regularly from a short time after its first issue, and have found it most useful and instructive. I have nearly completed a model monoplane, with wings 3½ ft. span, and hope to send you a photo of it shortly. All its fittings and its propeller were supplied by J. Bonn and Co., to the acquaintance of which excellent firm I am indebted to their advertisement in FLIGHT.

V. DE S. PINTO.

"Heathcroft," 8, Heath Drive, Hampstead.

SUITABILITY OF PATTERN-MAKERS FOR AEROPLANE WORK.

[408] Now that the construction of aeroplanes is one of the recognised mechanical arts, and will we hope develop in the near future into one of our staple industries, manufacturers of these machines will be undoubtedly considering what class of mechanic is most likely to adapt himself to this comparatively new and unexploited field of manufacture. What is required of the mechanic who takes in hand the work of aeroplane construction? He must be a perfect judge of wood, both with regard to its quality, its strength, and its suitability for the framework of the structure, and he must be able to manipulate that material with the most minute accuracy, and in such fashion as to secure a minimum of weight with a maximum of strength and durability. Of all the wood-working trades the pattern-maker undoubtedly possesses these essential qualities of selection and manipulation to a pre-eminent degree; he already makes the propellers for both airships and aeroplanes, he makes the patterns for the engines of both types of machine, and no part of his work calls for greater accuracy and care than the making of patterns for aerial engines, and in many of the experimental machines manufactured or in course of manufacture in this country, pattern makers have been employed not only on the framework but they have shown their adaptability by completing the whole of the work. As this is a new industry, it may not be out of place to make these facts public, and so assist manufacturers to secure workmen who are fitted by their training and adaptability to give the best results in this new and developing industry.

WM. MOSSES,

Eccles General Secretary Patternmakers' Association.

AEROPLANE *VERSUS* DIRIGIBLE.

[409] Having read with much interest the article in FLIGHT of February 26th, by Mr. J. Laurence Pritchard, B.A., on the relative merits of aeroplanes and dirigibles, I venture to submit some further remarks on the subject. In my opinion, the utility of either the present airship or aeroplane as applied to warfare is greatly exaggerated. The writer of the article in question appears to think that if an aeroplane was built and equipped with engine-power in proportion to a "Zeppelin" airship, *i.e.*, of 345-h.p., it would not only be capable of carrying a greater weight, but would also be capable of developing a speed more than double that of the airship, thereby attaining greater efficiency in warfare. An aeroplane of the dimensions given by your correspondent might not prove unwieldy when in the air, but to handle such a machine when landing on unprepared ground would be quite another matter. For all practical purposes the existing aeroplane is, in my opinion, sufficiently cumbersome, while further increase would only tend to defeat the very object for which it is intended; in fact, every effort should be made to keep within certain defined limits, and, if anything, rather to decrease the size in so far as is compatible with stability. Without doubt the aeroplane of to-day demonstrates that there is no limit to human ingenuity when in search of a means to achieve an

end. To all intents and purposes the air is conquered, and all that now remains is the necessary development and improvement, which undoubtedly will surely follow, and I have no hesitation in venturing the opinion that in the near future both envelope and plane will exercise its special influence, and fulfil its own useful purpose in a manner which at the present moment is difficult to forecast. I feel very confident on one point, *i.e.*, that ere long experts in aeronautics will have discovered that the unwieldy airship of the "Zeppelin" class is not only unnecessary and impracticable, but will soon be discarded in favour of a much smaller and handier craft. At the moment, there is a tendency on the part of the aeronautical architect to gravitate in the direction of high speed, which of necessity calls for an increase in size of envelope, in order to obtain an adequate lifting power for the more powerful, and consequently heavier engine, whereas the smaller ship, while not only quicker on the helm, and thus more efficient in every essential, would be quite capable of carrying a sufficient number of men for all practical and necessary purposes from a military standpoint. Such a ship should be able to remain in the air under almost any conditions, and at the same time be under perfect control; neither would it be found necessary to attain a very great speed in a vessel which could be so constructed that it would rise and fall at the will of the pilot without recourse to ballast, &c. It would also possess the all-important advantage of not presenting such a colossal target during the few moments in which it might be within range of an enemy's guns. After all, high altitude in warfare is the principal factor; therefore it will be readily understood of what paramount importance the rapidity of rise and fall has over speed, combined with the facility of alighting at any point, irrespective of ground conditions, and, moreover, to be able to inflate and deflate rapidly should occasion arise without cumbersome impedimenta. Without doubt the workable airship of the future must be reduced to a practical standard, with an engine which will develop sufficient horse-power to drive her at the full speed of, say, 20 miles an hour for 12 hours with a crew of 3 men. A vessel embodying these points would immediately enter upon a practical field of operations, not only as an engine of war, but as a vehicle of pleasure. Once a ship of this type appears on the market it is well within the bounds of possibility to anticipate for it an era of far greater magnitude than has been enjoyed by the motor-driven road carriage.

C. P. ELIESON.

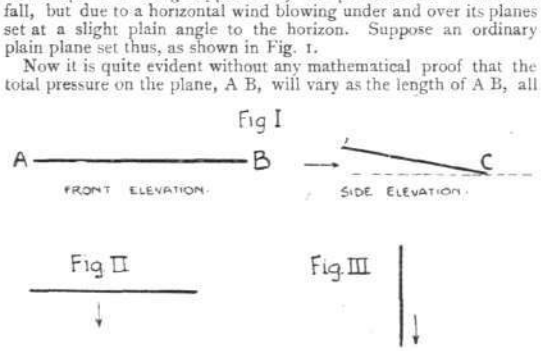
DIHEDRAL ANGLE.

[410] As I cannot bring myself to agree exactly with Mr. Cleuker's letter in your issue of December 18th, I am afraid that I must trouble you for a little of your valuable space, in the hope that by a thorough discussion we may do something towards settling the question.

With regard to the first explanation of the stability, Mr. Cleuker says, "With a dihedral angle, however, the resultant pressure on the two planes acts along a line bisecting the angle, and *always passes through the centre of gravity*, whatever the tilt, provided the C.G. continues in a straight line."

As the C.G. is to continue in a straight line we will not consider the aeroplane as being supported by the pressure due to constant fall, but due to a horizontal wind blowing under and over its planes set at a slight plain angle to the horizon. Suppose an ordinary plain plane set thus, as shown in Fig. 1.

Now it is quite evident without any mathematical proof that the total pressure on the plane, A B, will vary as the length of A B, all



other conditions remaining the same. But in the case of a dihedral angle this is just what happens, for when the planes tilt from their normal position the effective length of the one is increased, and of the other it is decreased; thus we obtain not a *righting force* but a *righting couple*.

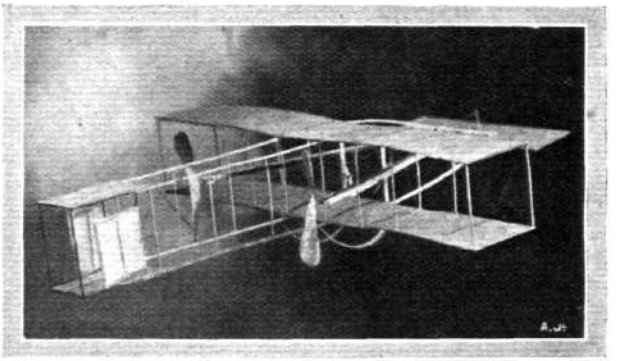
Re second explanation. I do not want to dispute at all the existence of Mr. Olley's force, O F, as I also showed in my mathematical analysis, in your issue of November 27th, that this force must exist, and no doubt *does help* the righting couple as long as the C.G. continues in a straight line, but on turning I am afraid that it would be completely neutralised by the centrifugal force of the machine, and so could not in any way contribute to the stability under these conditions, and I believe that the dihedral angle *does tend to give* lateral stability on turning, so evidently this stability does not arise from cause 2.

There are many different ways of looking at the problem, and if we consider the aeroplane as being supported by the pressure due to constant fall, we need only look at the two extreme positions the plane could have (Figs. II and III), and it is evident that the pressure on the plane *does vary with the* inclination of the plane, between the limits, Fig. II, when it is a maximum, and Fig. III, when it is a minimum; so the resultant pressure must also vary, and cannot always pass through the C.G.

Winchester. W. S. FLIGHT.

FARMAN SCALE MODEL.

[411] With reference to No. 315 of your correspondence, I am glad to be able to give a little help, as I have myself made a Farman model the size your correspondent mentions. The wood for the main framework is $\frac{5}{16}$ in. × $\frac{1}{2}$ in. maple. The wood for the planes is maple $\frac{1}{16}$ in. × $\frac{5}{16}$ in., and the sticks between the main-planes, &c., $\frac{1}{2}$ in. circular-section holly. Instead of one propeller as in the full-size Farman flyer, I have two 8-in. ones revolving in opposite directions. This model does not fly, as the tail is not to scale, but I think if I



made the tail a little larger, as it should be, I think it would. I have no balancing flaps as I did not think them necessary on a model, and the surfaces are not cambered. Trusting this will be of use to G. Jago, and of interest to other readers.

Wandsworth. A. E. CARTLIDGE.

THE FERGUSON AEROPLANE.

[412] In reply to the three letters, *re* my machine, in a recent issue of your paper.

"Propeller's" letter—As he seems in need of a little advice and guidance I will do all I can to help him.

Firstly, I beg to inform him that it is always well to read a letter carefully before commenting on it. Did "Propeller" do this?

Secondly, I would strongly advise him to build not two pairs of wings but ten, because anyone so obviously devoid of common sense could not possibly make a successful machine inside that number.

Thirdly, if he puts the present propeller he seems to be interested in on the scrap-heap and orders one from Clarke and Co., of Kingston-on-Thames, I am confident he will be quite satisfied and have a machine as successful as mine has been since I tried one. This will save him the necessity of trying and wasting a dozen.

Fourthly and lastly, to not take up other people's time and the valuable pages of FLIGHT by being so absurd as to ask questions and then answer them for himself.

"Humble Bee" shows a lot of sense in hiding his name—that is if he knows as much about my machine or any other as I credit him with knowing.

Nothing could give me greater pleasure than to have his opinion on why I have not flown as successfully as a machine could have done in the time. I am sure it would also interest all your readers, as all admit they have much to learn yet, and therefore, on behalf of them all, I ask for knowledge.

Now, Mr. Uriah Humble Heep, it is for you to respond.

I have nothing to say in reply to Cochrane and Co.'s letter, only what I have said before about my first flight. I have made the same performance many times since, but I never yet claimed that

my machine was a *successful* flyer. I can fly and do exactly the same performance over again with a Cochrane propeller, but I cannot fly successfully with it.

If Cochrane and Co. ask me to write your paper, giving the history of my experience with their propellers, I will certainly do so.

Antrim. H. G. FERGUSON.

ADVERTISERS' STATEMENTS.

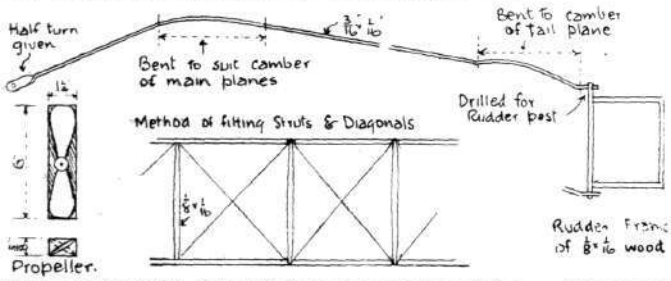
[413] We beg to point out to you another firm's advertisement on p. 31 of March 12th issue of FLIGHT, which appears just beneath our own. We think that this advertisement may tend to do us injustice. We must point out that all accessories made by us are of our own design, and not a copy of anyone else's work. We believe we were the first manufacturers of aluminium wheels, geared motors, and ball bearings for models in this country. We are an old-established firm, and it is beneath our dignity to copy others.

Trusting that you will publish this letter in your valuable paper,

A. E. JONES, Managing Director
F. MAYER, Manager } J. BONN & CO., LTD.

MODEL FARMAN BIPLANE.

[414] In replying to Mr. C. J. Jago (56), for my inch-scale model of the Farman biplane I used whitewood maple $\frac{3}{16}$ in. in breadth by $\frac{1}{16}$ in. thick. I took a strip 40 ins. long, commencing working from the centre of the elevating-plane and working to the front edge of the main plane, then steaming a part, the same distance as the width of the main plane, then continuing the length of frame-



work to the front edge of the tail plane, then steaming as before, the width of the tailpiece, leaving a quarter of an inch to allow for fixing the rudder. My model when finished only weighed $3\frac{1}{2}$ ozs. Kindly follow the sketch enclosed for further particulars.

Huddersfield. H. P. BENTLEY.

LONGITUDINAL STABILITY.

[415] Your correspondent Mr. Walker, No. 371, introduces some points concerning the above which I will try and clear up.

Concerning Messrs. Wrights' setting up of their forward surface at a negative angle, Messrs. Wright have never claimed *automatic* (or natural) stability, but the reverse, *i.e.*, pure *mechanical* (or personal), and to this end they destroy the inherent automatic stability (caused as mentioned by Mr. Chittenden by the travel of the cent. of pressure) as far as possible, and so obtain a machine which is more sensitive to the personal control. By reading the Wrights' patent, I think it will be seen that when they speak of "contrary to the usual custom" and increased stability, they do not refer to their "negative angle," but to the small surface being "*in front*" rather than "behind," as in the previous machines of Chanute (of whom the Wrights were pupils), Herring, Lilienthal, &c.

The Wrights point out that reduction in the speed of their machine will cause them to come down without pitching, *i.e.*, if they happen to be on an even keel they will come down on an even keel, but if, on the other hand, they happen, say, to be pointing upwards they will come down on their tail (*i.e.*, there is no natural recovery), but their experience would seem to show that they consider this the lesser danger.

Mr. Walker's division of disturbances into—(*a*) Alterations of the angles of the planes to the line of flight (*i.e.*, attitude disturbance); (*b*) alterations of the direction of the line of flight itself (*i.e.*, undulations or slopes) is good. But he is wrong in attributing (*a*) to variations in the speed; it is (*b*) which is so caused. With a given inclination of the surfaces to one another (*i.e.*, without using the control-lever) the machine tends to set itself so that the surfaces preserve constant inclinations to the line of flight (*i.e.*, the machine preserves a fixed *attitude*). This is in a machine with automatic stability, but in the Wright machine, for instance, there is no such tendency; the attitude is controlled solely by the pilot.

My previous letter showed the influence of speed upon (*b*). As to the ordinary righting effect due to the travel of the C.P. of each surface independently, I did not mean to neglect this, but the resulting displacement of the C.P. (and consequent righting couple) from this cause is considerably smaller than that due to my arrangement of the surfaces, especially if these surfaces are narrow and arched, as in present-day machines. To take a concrete example, take the figures given by Messrs. Chittenden and Robinson in their interesting paper:—

C.P. at 5° inclination is ·2 × *a* from front edge. (*a* being width of surface.)

C.P. at 20° inclination is ·35 × *a* from front edge.

So, for a variation of 15° in inclination we get a displacement of ·15 × *a, or about* 11 *in. for a surface* 6 *ft. wide.*

Personally, I think the figures given must refer to plane surfaces (possibly Joessel's experiments); for curved surfaces the C.P. is not so far ahead or so variable, say, ·3 to ·4 for the above angles.]

In the next case for my system, say we have area of front surface equals one-third of that of the back, and set up 3° relative to it, then (using the same lettering as in my previous article, page 56) the corresponding inclinations will be when back surface is inclined 4° (and front surface 7°) in which case $\frac{y}{x} = (\frac{1}{3} \times 7) + (1 \times 4)$, and when back surface is inclined 19° (and front surface 23°) in which case $\frac{y}{x} = (\frac{1}{3} \times 23) \div (1 \times 19)$, whence we get $y = \cdot 37 \times l$ and $\cdot 29l$ respectively, or for the variation of 15°, the C.P. is displaced $\cdot 08 \times l$ where l is the distance between the C.P.'s of each surface; in the case in which the back surface is 6 ft. wide this length would probably be about 19 ft. and the displacement would accordingly be 1·5 ft. or 18 ins., or rather over one and a half times that in the first case. The total displacement of the C.P. will be 11 ins. + 18 ins. = 29 ins., which means that if any disturbance causes the machine to pitch downwards through 15° there will be produced a couple equal to the weight of the machine at the end of an arm 29 ins. long tending to right it again. It is interesting to note that this is the same couple as would be produced by having the whole weight suspended 8 ft. 6 ins. below the surfaces, but without the attendant disadvantages.

In general, it may be said that automatic stability, while removing the necessity for continuous attention during long flights, reduces the sensitiveness of the machine to the personal control, and makes it more sensitive to atmospheric disturbance; its use will therefore increase with the practical progress of the science. T. W. K. CLARKE.

P.S.—Since writing the above, careful experiments by Mr. Sellers in America have shown that for curved surfaces of ordinary shape and camber (1 in 24) the C.P. is nearest to front edge when inclination is 15°, in which case it is ·35 × width back, and as the inclination is decreased the C.P. *retreats* (instead of advancing) to ·46 at 5°, so that with a single curved surface the travel of the C.P. makes it unstable, as is soon discovered when one tries to make a cambered rectangular single surface small paper glider.

A MODEL AERO CLUB.

[416] Following my recent letter in FLIGHT, you will, no doubt, be pleased to hear that quite a large amount of support has been promised in connection with the formation of a body to concern itself exclusively with model aeroplanes.

Knowing the difficulties of commencing a new organisation, I have interviewed, among others, representatives of the Aviation Section of the Motor Union, which body has been for some time maturing a scheme for the establishment of a special section to deal exclusively with models.

You will, no doubt, be pleased to hear that those who have corresponded with me have met representatives of the Aviation Section of the Motor Union and appointed a temporary Committee to complete matters to formally inaugurate the section on Wednesday, March 23rd, at 8 o'clock. The subscription has been fixed at 7*s.* 6*d.*, and for members under 18 at 5*s.*

It is the intention of the Motor Union and of the Aviation Section to use its influence and its organisation towards providing an institution for those interested in model aeroplanes, and all reasonable facilities in the way of technical advice, research work, interchange of ideas, exhibition of models, and the use of a library will be available.

It is also the intention of the Union to extend to the Model Section access to its flying ground, which is now being acquired; and in connection with this I need hardly point out the great advantage which will be derived from the use of a practice ground where full-size machines are continually at work. A. C. HORTH.

Gordon-Bennett Balloon Cup.

THE official list of entries for the Gordon-Bennett Balloon Cup, the race for which will start from St. Louis on October 14th next, contains eleven names, only France and America having complete teams of three, while Italy and Switzerland have two each, and Denmark one.

The New "Daily Graphic" Balloon.

A HUGE new spherical balloon of a capacity of 163,866 cubic ft. (68 ft. diameter) has recently been built by the *Daily Graphic* with the object of again assailing the long-distance record. It is now on view at the Crystal Palace, where a favourable opportunity is being awaited for making a start in charge of Mr. Gaudron and Capt. Maitland. Amongst other features of this huge balloon are the employment of a special rubber-canvas for the envelope and of a double-deck car; while its dead white appearance will render it a very striking object when aloft. The weights of the various parts and of the equipment are given as follows:—

The envelope and net, 1,010 lbs.; the car, 246 lbs.; upper deck, 100 lbs.; the padding, 61 lbs.; two mattresses, 23 lbs.; trail rope, 100 lbs.; ladder, 9 lbs.; rigging, 30 lbs.; food, 200 lbs.; instruments, 20 lbs.; cinematograph, 60 lbs.; total, 1,859 lbs.

About 3,400 lbs. of ballast is expected to be required, and the lifting capacity is assumed at 6,520 lbs.

"Carbic" Airship over London.

STARTING from the Wandsworth Gasworks, an attempt was made on Monday to sail the Spencer airship over London to Olympia and from there to St. Paul's, but unfortunately, soon after the start, motor trouble placed the airship at the mercy of the wind, and it drifted across London to Broadway Common, near Broxbourne. The demonstration was arranged by Messrs. C. D. Clayton, Ltd., with the object of bringing the name of Messrs. Wakefield's new acetylene generator before the public, and "Carbic" was painted on each side of the gas-bag, which is 80 feet long by 30 feet in diameter. Three passengers, Mr. Henry Spencer, Mr. F. W. Gooden and Mr. Ostler, were carried, and the highest altitude reached was 7,500 feet, as shown by the aneroid barometer.

PUBLICATIONS RECEIVED.

How to Build an Aeroplane. By Robert Petit. London: Williams and Norgate, 14, Henrietta Street, W.C. Price 2*s.* 6*d.* net.

Catalogues.

Model Aeroplanes and Accessories. Norman and M'Knight, 145, Argyle Street, Glasgow.

Motors, Chassis, Radiators, and Accessories for Aeroplanes. G. H. Smith and W. H. Dorey, Ltd., 14A, Great Marlborough Street, W.

Accessories for Full-Size and Model Aeroplanes. Eyquem's Patents, 10, Dean Street, Oxford Street, W.

Wolseley Marine and Aero Engines. The Wolseley Tool and Motor Car Co., Ltd., Adderley Park, Birmingham, and Cowes, I.W.

North British Aeroplane and Balloon Fabrics. The North British Rubber Co., Ltd., Castle Mills, Edinburgh.

EASTER HOLIDAYS.

In consequence of the Easter Holidays, FLIGHT will go to press earlier than usual. All editorial and advertisement matter must therefore reach the office, 44, St. Martin's Lane, W.C., not later than the first post on Wednesday.

DIARY OF FORTHCOMING EVENTS.

British Events.

1910.		1910.	
Mar. 11–19	Flight Exhibition at Olympia.	Aug. 6–13	Flight Meeting, place not fixed.
July 11–17	Bournemouth Flight Meeting.		

Foreign Events.

1910.		1910.	
April 2–10	Biarritz.	July 14–24	Rheims to Brussels, cross country event.
April 3–10	Cannes.	July 24–Aug. 10	Belgium.
April 10–25	Nice.	Aug. 25–Sept. 4	Deauville.
May 10–16	Berlin.	Sept. 8–18	Bordeaux.
May 14–22	Lyons.	Sept. 24–Oct. 3	Milan.
May 20–30	Verona.	Oct. 18–25	America. Gordon-Bennett Balloon Race.
June 5–12	Vichy.	Oct. 25–Nov. 2	America. Gordon-Bennett Aeroplane Race.
June 5–15	Budapest.		
June 18–24	St. Petersburg		
June 26–July 10	Rheims.		

Aeronautical Patents Published.

Applied for in 1909.

Published March 17th, 1910.

3,965. S. H. HOLLANDS. Aeroplanes and starting gear.
19,874. H. A. SANDERS. Launching projectiles, &c., from aerial machines.
21,485. A. C. JUST. Orthoptic flying machines.
26,916. M. H. BAUER. Propellers.

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